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This Month's Cover

Shown against the background of the Greenbrier, nestled in the Allegheny Mountains of West Virginia, are four of the speakers for the June II meeting of the NPFI. Starting at top left, they are, clockwise: William M. Fifield, Henry L. Ahlgren, Dr. Pierre Andre Rinfret and J. E. Streetman. See story on page 19.

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Vol. 16, No. 6

June, 1961

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MEETING CALENDAR

- June 5-7 Southern Feed, Fertilizer, and Pesticide Control Officials, Annual Meeting, Lafayette Hotel, Lexington, Ky.
- June 6-7 Summer Meeting, Georgia Plant Food Educational Society, Wanderer Motel, Jekyll Island, Ga.
- June 9-17 European Congress of Chemical Engineers and ACHE-MA Congress 1961, Frankfurt am Main, Germany.

- June 11-14 Annual convention.

 National Plant Food Institute.

 The Greenbrier, White Sulphur Springs, W. Va.
- June 20-22 Pachic Branch, Entomological Society of America. Miramar Hotel, Santa Barbara. Calif.
- June 24 Del-Mar-Va Peninsular Fertilizer Association, George Washington Hotel, Ocean City, Md.
- June 27-29 Twelfth Annual Fertilizer Conference of the Pacific Northwest, Marion Hotel, Salem. Oregon.

- July 19-21—Fertilizer Management Seminar, International Minerals & Chemical Corp., Skokie, Ill.
- July 19-21 Southwest Fertilizer Conference and Grade Hearing, Galvez Hotel, Galveston, Texas.
- Aug. 7-9—Symposium on Pesticide Residues. 18th International Congress of Pure and Applied Chemistry, Montreal, Canada.
- Aug. 27 Sept. 1 Annual Joint Meeting of Biological Societies. Purdue University. Lafayette. Ind.
- Sep. 3-8 140th National Meeting. American Chemical Society, and National Chemical Exposition. Chicago.
- Sept. 18-20—Canadian Agricultural Chemicals Assn., 9th Annual Meeting, Mont Tremblant Lodge, Mont Tremblant, Quebec.
- Oct. 2-6-National Hardware Show, McCormick Place, Chicago.
- Oct. 9-10 Four-State Applicators & Chemical Conference, Chinook Motel and Tower, Yakima, Wash.
- Oct. 9-11—Western Agricultural Chemicals Association, Annual Meeting, Hotel Claremont, Berkeley, Calif.
- Oct. 16-18 Entomological Society of Canada, Entomological Society of Quebec, Joint Meeting, Quebec, P.Q., Canada.
- Oct. 20-22 Eastern Lawn, Garden, and Allied Products Trade Show, Coliseum, New York.
- Oct. 29-Nov. 1 National Agricultural Chemicals Association, 28th Annual Meeting, The Homestead. Hot Springs, Va.
- Oct. 31-Nov. 2—National Fertilizer Solutions Association, Annual Convention, Edgewater Beach Hotel, Chicago.
- Nov. 2-3 Pacific Northwest Plant Food Association, annual convention, Hotel Gearhart, Gearhart, Oregon.
- Nov. 6-7 Annual Weed Conference. Washington State Weed Association. Chinook Motel and Tower. Yakima. Wash.
- Nov. 7-10 British Insecticide & Fungicide Conference, Brighton. England. Sponsored by Association of British Manufacturers of Agricultural Chemicals.
- Nov. 8-10—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.
- Nov. 12-14 38th Annual Convention of California Fertilizer Association. Jack Tar Hotel. San Francisco.

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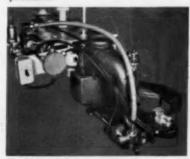
- 1. Reduced Packaging Costs. I&C's pay for themselves. Their fast, automatic operation reduces packaging and labor costs, increases profitability. Dozens of repeat orders attest to their efficiency and economy.
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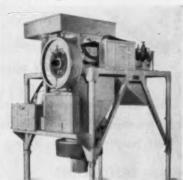
speeds of 20 bags a minute and more, weight variation is within plus or minus 2 ounces on 100 lb. packages of uniform granular or pelletized



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Crop Controls And Chemical Sales

STUART L. Spradling, director of research for the M-F-A Oil Company, Columbia, Missouri, has written Agricultural Chemicals regarding our April editorial dealing with the new Kennedy farm program and its effect, if any, on the sale of agricultural chemicals. Mr. Spradling observes that if all United States farmers were using chemicals at optimum rates to get lowest per unit production cost, any production control program, whether based on acreage restrictions or quotas, on per bushel or per pound basis, would reduce chemical usage.

He points out, however, that since only a small percentage of farmers are near the threshold of optimum chemical usage, production quotas based on bushels and pounds should encourage farmers toward this optimum usage and, actually, increase chemical sales. Chemical tools, he argues, simply enable a vast percentage of U. S. farmers to grow their allotment on fewer acres and thus minimize the tillage, planting, and harvesting costs per bushel.

Mr. Spradling recommends that a conscientious, industry-wide effort be made to promote chemical usage for optimum economic return to the farmer, although he cautions against the encouragement of farmers to purchase chemicals whose use will not result in a net profit. Such a program, he points out, coupled with satisfactory production controls and increased farm prices, will be beneficial both to agriculture and to the chemical industry.

We can only agree with Mr. Spradling in this regard, although we believe he has misinterpreted our April editorial as a criticism of the Kennedy approach to control crop surpluses. What we said essentially was that the Kennedy approach will be on a different basis than the previous farm program and that manufacturers of fertilizers and pesticides may soon learn whether their sales will be affected. We did not say that farmers would necessarily use less fertilizers on more acres but rather that they might do so.

We, of course, do not feel it makes sense for farmers to use less fertilizer simply because they are able to farm more acres, but there are indications that in actual practice things may work out this way. 1961, which promised to be a record season for fertilizer sales, now is being regarded by many producers as being little better than average because of the government's grain bank program which is encouraging farmers to divert corn acreage to other crops and, thus, reduces the demand for potash in fertilizer formulations.



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JUNE, 1961

Trade Listing

National Agricultural Chemicals Association Association Building. 1145 19th St. N.W. Washington. D. C. Lea Hitchner. exec. sec.

National Plant Food Institute, 1700 K St., N.W., Washington, D. C. Paul Truitt, president.

American Potash Institute, 1102 16th St. N.W., Washington 6, D. C. H B. Mann, president.

American Society of Agronomy, 2702 Monroe St., Madison, Wisc. Dr. Matthias Stelly, exec. sec.

American Phytopathological Society, S. E. A. McCallan, secretary.
Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society. 1155 18th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 548. Benjamin Franklin Station, Washington, D. C. William Horwitz, secrelary-treasurer.

Agricultural Ammonia Institute. Hotel Claridge, Room 305. Memphis, Tenn. Jack Criswell, executive vice-president.

American Society of Agricultural Enginers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph. Mo.

Carolinas-Virginia Pesticide Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association. Sidney Bierly, executive secretary, Room 213, Ochsner Building, 713 "K" Street, Sacramento, Calif.

Chemical Specialties Manufacturers Association. 50 East 41st St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America. 4603 Calvert Rd., College Park. Md. R. H. Nelson, secretary.

National Fertilizer Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, P. O. Box 9905, Memphis, Tenn.

Soil Science Society of America. 2702 Monroe St., Madison, Wisc. L. G. Monthey, exec. sec.

Sulphur Institute. 1725 K. St., N.W. Washington 6. D. C. Dr. Russell Coleman, president.

Weed Society of America. W. C. Shaw. secretary, Field Crops Research Branch. Beltsville, Md.

Western Agricultural Chemicals Association. Charles Barnard. executive secretary, 2466 Kenwood Ave.. San Jose, Calif.



• Standardization . . . The question of whether or not there is a need for standardization of raw materials in the fertilizer industry has been the subject of many discussions since it was brought up last November at the Fertilizer Round Table. Agricultural Chemicals has conducted a survey to determine the sentiments of those actually involved in fertilizer formulation. Part one of a two-part report. Page 14.

 World Pesticide Market . . . A first-hand report by a pesticide industry official who has travelled widely abroad indicates that there exists a great opportunity for pesticide sales to under-developed nations. There are pitfalls, however. Page 17.

 Carbamate Insecticides . . . The successful development of Sevin as a commercial insecticide has highlighted the potential importance of the aryl N-methylcarbamates for insect control. A number of them are described by a leading authority. Page 20.

Proper Bog Handling . . . Some of the problems occasionally encountered in the handling of multiwall bags could be avoided if the packer became more familiar with the capabilities of the container and followed the fundamental rules for handling multiwalls, Page 27.

 Influence of Dealers . . . The results of a survey of fertilizer dealers in South Carolina indicate that they play an important role in influencing farmers about fertilizer use. Page 33.

 Fertilizer Production in Italy . . . The expansion of production of chemical fertilizers in Italy is a main feature of the growth of the Italian chemical industry. In addition, Italian chemical fertilizers now are being exported in increasing quantities to foreign markets. Page 40.

 The Ag Chem Dealer . . . A distinguishing feature of the first GLF home and garden store to be located in a shopping center is the staff of more than 20 experienced employees who are capable of helping home owners with their lawn and garden problems. Page 47.

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GUEST EDITORIAL



By J. D. Stewart, Jr. Chairman of the Board National Plant Food Institute

THE end of the fertilizer year is always a good time to take stock and consider the future. As the industry rises to new highs in terms of plant nutrients, new and perplexing problems often appear.

Now is the time to review, analyze, and sharpen our tools to build for next year.

Essentially, we in this industry are builders. We are builders of a more efficient agricultural productive system, of a more prosperous agriculture, and of a steady high-quality supply of food and fiber for a growing nation. All of this is being achieved at a reasonable cost to consumers.

Since the National Plant Food Institute was created, in 1955, it has grown in stature. It has served and will continue to serve the industry in many areas. These include agronomy, agricultural economics, publicity and public relations, governmental affairs, chemical control, and cooperation with other scientific and professional organizations serving agriculture. To this we are dedicated, but the task is neither simple nor easy. Our dollars must be stretched. We do not worship the status quo. Neither do we believe in change for its own sake. We shall strive to see to it that change in the Institute's program represents progress and motion in the right direction. Akin to this point, our Board believes that our program should include those industry activities and functions which may best be legally performed by the group as a whole and should exclude those activities and functions which may best be performed by members individually. The broadest support from all segments of the industry is urgently desirable to permit the Institute to reach its full potential.

Other problems besides cost and support should not be overlooked. As an industry, we are passing into a new era with reference to agricultural legislation. The "New Frontier" is moving down onto the farm as well as into high places in politics, government, and finance. New regulations will bring changes yet undefined to our industry. These will call for alertness and ingenuity on our part.

Technological developments continue apace. Newer products and newer marketing programs continue to affect us, as producers, and our customers, the farmers. The need for educational work as a basis for good merchandising continues high.

In the manufacturing and chemical control areas, work to refine analytical methods and to teach new procedures to chemists should be accelerated. This is one productive way to cut costs and nourish net profits.

As we look to the 1961-62 fertilizer year, clearly the signal now is for vision, good planning, and hard work. Let us never forget that fertilizer still is the farmer's best buy. It is his best cost-cutting tool. No other investment pays him such a high rate of return. We have utmost confidence in the future of the fertilizer industry because profitable farming is basic to a sound national economy, and fertilizer is basic to profitable farming.**

Mr. Stewart is president of Federal Chemical Company, Louisville, Ky.

STANDARDIZATION

Is It Desirable In Fertilizer Materials?

The arguments in favor of more-uniform fertilizer raw materials point to the benefits of a relatively uniform raw material supply that will enable the formulator to count in advance on what he will be getting in the next delivery of raw materials, regardless of the supplier from whom they were purchased, and formulate accordingly.

Some fertilizer mixers and suppliers, however, in response to an Agricultural Chemicals survey, feel that this ideal situation is one which might, in actual practice, turn out to be neither possible nor desirable. What is generally agreed upon is the need for standardization of terminology. (Part I of a two-part report.)

HAT does the fertilizer industry in general think about uniform nomenclature for the raw materials it buys, standard specifications for these materials, standard test methods and perhaps a greater degree of standardization in the products themselves? Agricultural Chemicals has been seeking some of the answers to this group of questions since a Panel of Users at the Fertilizer Round Table last November first raised this issue. (See Agricultural Chemicals, Dec., 1960, pp. 30-32 and April, 1961, pp. 13. 46-47.)

The arguments in favor of more uniform raw materials were outlined fully in our previous coverage of the subject. What proponents of the idea are seeking is apparently a relatively uniform raw material supply, so that they can count in advance on what they will be getting in their next delivery of raw materials regardless of the supplier from whom purchased, and can formulate accordingly. To judge from some of the opinions expressed by fertilizer

mixers and suppliers alike, in our continuing investigation of the subject, however, this ideal situation is one which might, in actual practice, turn out to be neither possible nor desirable.

Commenting in this vein, Harry L. Cook, director of research and technical services for the Fertilizer Manufacturing Division of The Farm Bureau Cooperative Association, Columbus, Ohio, says: "With regard to standardization of terminology, I see no justification for all the confusion in this area. The industry is laggard in not working out standard terminologies. From the standpoint of standardization of product, however, I do not feel this is practical from an economic standpoint, or possibly even desirable. If it were attempted, we would encounter a situation in which not all suppliers could meet the highest standards. Thus we would inevitably end up setting standards which would be lower than the average the industry can meet. This would be going backwards. The simple way to control standards of raw materials is not to buy from those suppliers who cannot meet your requirements."

Somewhat the same sentiments were expressed by a supply representative, who indicated that he preferred not to be identified. He gave a strong "yes" to standardization of terminology, but added, "Heaven forbid product standardization. Let's hope the basic producers do not allow themselves to be bullied or threatened into panic on this business. They took more on the chin during the Round Table discussion than was necessary. You can hardly blame them for being 'gun shy' or, as your article says, 'somewhat uncommunicative.' If you will ask a panel of fertilizer retailers what they think of standardization of the product they sell, perhaps they too will become uncommunicative. 1 hope you don't think this is a smart-aleck answer to your serious and well thought out article. It isn't meant to be. Keep up the good work."

This supplier was not alone in being unwilling to comment publicly on the subject. Another correspondent stated, "Our company has decided that my opinion regarding standardization in nomenclature and materials had best not be published, lest it offend some of our customers, as well as control officials. My views were that rather sweeping changes should be made in our nomenclature, but were against standardization of quality."

Rigid Standardization Not Required

NOTHER opinion opposed to A standardization of industry products was registered by Philip B. Turner, general manager, Aroostook Federation of Farmers, Caribou, Maine, who advised that he spoke from experience as both a buyer as well as a seller of raw materials. In his opinion, "The fertilizer industry does not require nor warrant, economically, rigid standardization of materials. Rather standardization of measurement is indicated so that the manufacturer will know he is buying materials suitable to his needs.

"Let us consider first the basic plant food elements: nitrogen, phosphorus and potash. Most of the nitrogen used in the fertilizer industry is derived from synthetic sources. It is manufactured as urea, ammonium nitrate, ammonia, etc. These materials in combination result in either dry nitrogen sources or solution sources which are suitable for large plants, small plants, modern plants or old, non-modern plants. Each ratio, each grade and each type of plant has particular requirements; for example, 3-18-9 would require a high amount of free ammonia, whereas 15-10-10 requires a large amount of fixed nitrogen. I believe standardization of nomenclature is required in this field. This, of course, has already been attempted, with partial success. The standardization of nitrogen materials has been pretty well accomplished.

"The phosphate materials do not lend themselves to standardization because they are minerals that are mined. These natural ore bodies contain varying quantities of phosphorus. I will agree with the panel that a 20% superphos-

phate and a 46.5 triple would be ideal from the manufacturers' point of view. From the purchasing point of view, considering freight and its reflection in cost, I want the highest analysis available. However, there are times when a superphosphate of 18% P2O5 would suit the manufacturing needs, such as grades containing small amounts of phosphorus as 10-3-7. If the cost of putting all super and triple into a standard chemical analysis and physical analysis, allowing a variable of 0.5%, is to be passed on to the consumer, then the economics will need a rather complete study. It appears to me that the measuring and weighing which takes place in the present fertilizer factory is inadequate for standardized materials. I would like to know more about the physical characteristics of the product I am considering. Certain physical characteristics, as a fertilizer manufacturer knows, affect the chemical characteristics;

therefore, ammonia sorption, screen size, free acid, and hardness of particles should be designated.

"Now, as for potash these materials have been worked upon by all the Fifth Ave. boys, given fancy names, etc., but really what affects their end use can be designated in two categories: (1) Their degree of fineness or coarseness and (2) The degree to which they are wet or resist wetting, since this affects granulation. Particle size has been considered at several Round Tables where participants discussed seeding granulation with granular potash and others pointed out that this technique is a poor substitute for good granulation procedures. I concur with the latter point of view. Description to the buyer should include sieve analysis of both granular and nongranular types, and some indication of the degree of wettability."

A vote for standardization of nomenclature was cast by W. B. Porterfield of Freeport Sulphur Co., New York, who said "I feel that standardization in nomenclature of fertilizer raw materials will be well received by the purchasing agents and users of these materials. It is very confusing, I am sure, for the fertilizer manufacturers to have a like material called by several different names by producers."

Similar Specifications Are Desirable

NOTHER favorable comment A on the move toward standardized nomenclature and specifications was registered by D. C. Washburn, Winona plant, Northwest Cooperative Mills, who said "It would seem to me that the nomenclature should be standardized and specifications for each grade somewhat similar. A coarse potash should have certain screen specifications, and so with granular or standard or any other particular designation. The nitrogen suppliers have set-up a system of nomenclature so that the whole

industry can at least talk in the same language.

"The most important aspect of standardization from my own personal point of view would be on the analysis of the material purchased. For instance, I checked on a shipment of 18 cars of coarse potash we received shipped over a period of about 10 days. The analysis varied from 60.56 K₂O to 61.44 K₂O. If we use all the material directly from the car, we can utilize the plant food content, otherwise we are going to lose some of the plant food value.

Likewise, the analysis of wet process phosphoric acid varies greatly as to P₂O₃, and water content. Again we can minimize the loss due to difference in analysis, but we will necessarily incur loss of plant food value that we have purchased.

"As is well known, fertilizer manufacturers must guarantee a minimum analysis on all material we ship and we are not able to bill the customer for any overage in analysis we might supply. At the same time we may be penalized if we are below standard. The question I'd pose to producers is 'Cannot some way be found to minimize the difference in analysis of raw materials you produce?' " present in the ore into compounds that can be utilized by the growing plants and (2) at the *lowest* possible cost. These have been the criteria of successful production.

"We all know that these two objectives are now being met to the great benefit of the farmer and ultimately to the consumers of food and fiber nationwide. However, this direct process, aimed as it is at efficiency and low cost, does not readily lend itself to yield, for example, a particular particle size distribution nor an active ingredient content within a very narrow range. To accomplish such an additional goal will require further processing steps or perhaps preferably a radically revised process.

"How much are customers willing to pay for extra manufacturing cost in order to obtain a product of greater uniformity and possessing certain specified characteristics? This question lies at the heart of the free enterprise system and can only be answered in the market place. You can bet that every supplier is working to improve his own competitive position by product improvement. When the results from selling experience have with some degree of reliability determined the proper balance between cost and uniformity, it will be appropriate to take the next progressive step, that of product standardization."

Will Buyers Pay For Added Costs?

ANOTHER participant in Ag Chem's symposium, Darwin DeLapp, group leader, fertilizer research, American Cyanamid Co., Stamford, Conn., speaks out like most others who registered their opinions, in favor of uniform terminology and standardization of test methods, but on standardization of raw materials he asks the important question as to whether or not the buyer is prepared to pay the necessary added costs. His full comments are as follows.

"Standardization of methods for the measurement of chemical and physical properties is a desirable and realistic objective. The procedures presently in use are fundamentally very similar and I would foresee no major obstacle to establishing a standard method on an industry-wide basis for most raw materials. The Association of Official Agricultural Chemists is already considered a final authority for analytical determinations performed on a host of agricultural chemicals.

"Uniform terminology also presents no insuperable difficulties, although it is difficult to stop using a particular name or designation that has become second nature by life long use. Fortunately, most experienced people have accepted the inevitability that to live means to change. Surely most will gladly use definitive, semantically accurate nomenclature, agreed upon by his colleagues for the purpose of insuring clear understanding between customers and suppliers.

"The desirability of further standardization of products re-

quires a broad look at the overall situation. Many raw materials being supplied are not only of a standardized nature but are remarkably pure chemically. A moment's thought brings quickly to mind NH3, NH3NO3, (NH3) 2SO4, urea, and the various grades of potassium materials. Historically, most of these products were first manufactured to meet the demanding needs of the chemical industry. They grew into the stature of major raw materials for the fertilizer industry only after technological developments reduced manufacturing costs significantly and the advantages of high analysis fertilizers became widely recognized. Superphosphate and triple superphosphate present a different aspect. These are made simply by mixing a mineral acid with a natural ore of varying composition, with the avowed objectives of (1) converting the phosphate values

Knowledge Of Characteristics Needed

FRANK T. Nielsson, International Minerals & Chemical Corp., plant food division, believes that the prime requisite is "accurate knowledge of the characteristics (chemical and physical) of each shipment. With that we can then live up to the extent of what we want to pay for definite specifications."

On the general subject of standardization and uniform nomenclature, Mr. Nielsson observes:

"I believe the Nitrogen industry has made the greatest strides in nomenclature. The new NPFI notation permits complete designation of product composition for liquids. However, it is extremely difficult to obtain particle size guarantees on solid materials. To obtain solid ammonium nitrate, urea, or ammonium sulfate in a given range of particle sizes, one has to contact a number of suppliers to discover which supplier has a product that happens to fall in the range in which you are interested.

(Continued on Page 101)

The World Pesticide Market

Ideally, agricultural nations abroad should be able to produce their own pesticide requirements. Until this has happened, of course, many agricultural areas must look to other countries for the chemicals they may need. For those looking for business abroad, however, quality should be the by-word.

by P. J. Reno

Hercules Powder Company

EGYPT is a country that in tions overpopulated in the rural areas, and with too few jobs in industry to absorb a substantial percentage of its people. It represents countries that in many ways may be very important to the plans of American manufacturers of agricultural chemicals.

Agricultural authorities in Egypt are highly intelligent, hardworking, and devoted to the advancement of their agriculture. This is due not only to a well-developed sense of national pride, but also to a sincere interest on their part in the welfare of the individual farmer and the community that his produce serves. It is the rule, rather than the exception, to find that these agricultural leaders have earned advanced degrees from the finest universities of the world.

Egypt has done a remarkable job during the past few years in

producing top yields of quality cotton through good utilization of pesticides. The approximately one and one-quarter million acres planted to cotton is the backbone of the Egyptian economy. (A remarkable job of mixing the modern with the desirable old practices has been done by them on this important crop.) More recently, they have learned that it is possible, using similar techniques, to increase yields of corn from 10 bushels to close to 100 bushels per acre, and Egypt soon will be close to self-sufficient in this commodity.

The proper use of pesticides can very quickly free many foreign areas from hunger, and this should come before mechanization. The next step should be an integration of agriculture with industry. Ideally, agricultural nations abroad should be able to produce their own pesticide requirements. However, until this has been accomplished, many agricultural areas will look to other countries for the chemicals they need.

The potential business that can be expected will depend on several factors . . .

- How will the widespread use of pesticide materials dislocate the economy of the nation concerned?
- The availability of the pesticide materials required.
- The job-value of the specified pesticides.
- 4. The quality of the materials sold.

For those looking for business abroad, quality should be the by-

word. They should be certain they can produce pesticides as specified, at a price they can be sure leaves a safe margin of profit. And, of course, they must be able to meet the delivery date, because time moves as inexorably overseas as it moves in the United States, and a pesticide delivered too late may leave a wake of starvation and misery.

In short, a manufacturer should not promise anything he can't fulfill, because repeat orders are important.

On a long-term basis, pesticide producers should get to know the countries with which they deal. They should study seriously whether they may have to become manufacturers in the country they expect to serve. This, of course, calls for a thorough knowledge of the country and its people.

A country with real problems and real opportunities is India, where agriculture is very largely geared to a wooden plow pulled by bullocks. The average farmer in India has slightly less than four acres. Indeed, with the equipment with which he has to work, he would be hard-pressed to take care of more than five or ten acres.

Pesticides were introduced to this agricultural economy only a few years ago, and, today, only two insecticides are produced in the entire nation. Several formulators convert these basic insecticides and a variety of imported materials into finished formulations, some of which are sold through local distributors, subdistributors, and dealers. About 75

From a talk presented at the March 4 meeting of the Western Agricultural Chemicals Assn., Anaheim, Calif.



Where there has been success in the sale of pesticides outside the United States, it has come only after hard work and years of patient waiting. There still is much hard work ahead, but the years of waiting appear to be near an end.

P. J. Rone
Manager, Agricultural Chémicals
Division, Hersules Pawder Co,
Wilminaton, Del

per cent of pesticide sales, however, are made directly to the state governments on a tender basis.

India is a vast nation, with about 300 million acres in cultivation. Some of the more important crops are rice, wheat, cotton, and peanuts. Cotton in India is faced with a severe bollworm and pink bollworm problem. Of the 20 million acres of cotton, however, only about 2 per cent receive any pesticide protection. Yields reflect this, with only 3.75 million 400-pound bales being produced on those 20 million acres. This amounts to about 75 pounds of lint per acre. U. S. production was 462 pounds per acre in 1959. Land in India is as good as it is in the U.S. Is it not possible for yields to be as high?

It would seem, therefore, that cotton in India is a very promising market for an American insecticide producer. The two materials now made in India cost about twice as much as they do in the United States. But, there are many pitfalls.

The foreign exchange situation in India is extremely critical. The government is attempting to increase local manufacture of all goods, and discourages imports. Actually, all pesticides now being imported are in technical form.

Communications in India could be very difficult for even the most ambitious staff of sales representatives. There are 15 states and six territories. Within this area, 14 main languages are spoken, with several hundred different variations of dialect.

The various Indian states are quite independent; each one tests and evaluates pesticides under local conditions. Each state, in turn, is divided politically into districts and sub-divisions, and, finally, into "Thanas" or blocks. Agricultural information is passed down this complex chain until it reaches village-level workers who disseminate agricultural and other information. Pesticide distribution follows this same pattern until materials get to a "union," a semigovernmental organization which sells to farmers. However, if a real disaster hits (such as a locust plague) the central government may supply aircraft and insecticides free.

Although the states actually purchase the finished pesticides, the central government contributes funds in a 50-50 ratio. The states say they are in the pesticide business because farmers would never have learned the value of pesticides if the states hadn't done the promotion and set up a distribution system featuring low prices through subsidies.

Although there are other problems facing a manufacturer who wants to do a business in India, the situation is not hopeless. Only about \$1,500,000 worth of pesticides were imported into the country during 1959. Of this, one million was from the United States

from the U. S. five years before.

So, while India would be one of the most difficult markets of all to enter, it also presents one of the greatest potentials.

Another nation in that part of the world, Pakistan, also has a primitive agriculture. Like India, individual farms are small, with 95 per cent of the crops grown on farms of about three acres. There are two growing seasons in Pakistan; Kharif (from April to October—this is the season of the monsoon rains) when maize, wheat, cotton, rice, and sugarcane are grown; and Rabi (from November to March) when wheat and vegetables are grown during the lighter winter rains.

There are about 26 million acres under irrigation in Pakistan, with water supplied by the Indus river, which flows for 1,000 miles, and 4 other rivers. Rice and wheat are the two main crops, although there are about 3 million acres of cotton under cultivation.

Pesticides have been supplied to farmers free of charge in Pakistan during the past five years. This is part of a carefully planned program designed to introduce growers to the advantages of pest control. By 1965 the Ministry of Agriculture hopes that pesticides will be so popular that the government can turn over distribution ard rele to private industry.

At the present time, 4 per cent of the cultivated acreage in East Pakistan, and 9 per cent in West Pakistan are treated with pesticides. By 1965 the government expects those figures to rise to 14 per cent and 16 per cent respectively.

During the next five years, the government expects the purchases of finished pesticides (mostly insecticides) to rise from the 1960-61 total of four million dollars to somewhere around nine million dollars.

These pesticides are all imports, with a large part of the bill

(Continued on Page 102)



Speakers To Cover Farming & Business At NPFI Meeting

Among the topics scheduled to be discussed are: "Economics of Tomorrow," "Coming Developments in Farming," and the "Future Role of Agricultural Extension." The Board of Directors will meet on June 11 and 14.

SECRETARY of Agriculture Orville L. Freeman will be among the speakers at the annual convention of the National Plant Food Institute, to be held at The Greenbrier, White Sulphur Springs, W. Va., June 11-14.

The program for Monday, June 12 will include: Welcoming remarks by J. D. Stewart, Jr., Federal Chemical Co., Louisville, Ky., Chairman of the Board of Directors of the Institute: Dr. Pierre Andre Rinfret, a distinguished economist, who is vice president and director of economics division, Lionel D. Edie & Company, Inc., New York, on "Economics of Tomorrow"; followed by Secretary of Agriculture Freeman. Other features of the program Monday morning will be the presentation of Distinguished Service Citations to past presidents and past chairmen of the board of the Institute and the Organization's annual business meeting.

The program on Tuesday, June 13 will feature addresses by W. M. Fifield, provost for agriculture, University of Florida, Gainesville, who will speak on the subject of "Coming Developments in Farming"; Henry L. Ahlgren, associate director, Extension Service, University of Wisconsin, at Madison, who will speak on the "Future Role of Agricultural Extension"; and J. E. Streetman, vice president and director of marketing, Ralston Purina Co., St. Louis, Mo. Scrolls will be presented to the winners in the "Soil Management Award for Editors" contest on Tuesday.

Paul T. Truitt, president of the Institute, will preside at both program sessions.

Meetings of the Board of Directors will be held Sunday evening, June 11 and on Wednesday morning, June 14.

Committee chairmen for the

1961 convention are: Mrs. Gene Van Deren of Cynthiana, Ky., Bridge and Canasta Party Committee; Mrs. J. Fred Corkill of Los Angeles, Calif., Ladies' Golf and Putting Committee; W. R. Morgan of New York, Men's Golf Committee; Tracy L. Adcock of Chicago, Horseshoe Pitching Contest Committee; Mr. and Mrs. W. B. Copeland of Little Rock, Ark., Hospitality Committee; Mrs. John W. Hall of Denver, Colo., Ladies' Committee; L. Dudley George of Richmond, Va., Memorial Committee; and Dr. Richard B. Bahme of San Francisco, Tennis Committee.**



Orville L. Freeman Secretary of Agriculture



Paul T. Truitt

CARBAMATE INSECTICIDES

A number of the aryl N-methylcarbamate compounds show unusual promise as insecticides relatively safe for the applicator, free from the chronic toxicity problems of storage in animal fats, and with unusually selective insecticidal activity. One of the interesting features of this group of compounds is the synergism produced by combinations with the methylene-dioxyphenyl synergists. These materials can synergize the action of Sevin, for instance, as much as 30 times against house flies.

HE successful development of Sevin (1-naphthyl N-methylcarbamate) as a commerical insecticide has highlighted the potential importance of the aryl N-methylcarbamates for insect control, and thousands of related compounds are currently being synthesized and evaluated in at least a dozen research laboratories in various parts of the world. A number of them, to be described later, show unusual promise as insecticides relatively safe for the applicator, free from the chronic toxicity problems of storage in animal fats, and with unusually selective insecticidal action.

These carbamate insecticides are all synthetic derivatives of the alkaloid physostigmine or eserine found in the Calabar or ordeal bean, Physostigma venenosum of French West Africa. This bean has been used for centuries by the natives as a trial or truth drug. The alkaloid physostigmine was isolated from this plant in 1864 and its structure was described by Barger and Stedman in 1923. This material, because of its pronounced cholinergic action, has been used for many years in the treatment of the human diseases glaucoma and myasthenia gravis. The first important synthetic study in this field



by Robert L. Metcalf University of California, Riverside

was the classical work of Stedman (1926) who synthesized the isomeric dimethylaminophenyl Nmethylcarbamates, investigated the pharmacological properties of their hydrochlorides and quaternary ammonium salts, and subsequently produced the drug prostigmine or m-dimethylaminophenyl N,N-dimethylcarbamate methiodide, which is used similarly to physostigmine. A great volume of synthetic work has been done in this field leading to the production of many other highly effective anticholinergic substances for pharmacological use. However, all of these compounds contained the quaternary ammonium grouping which we now know is unable to penetrate through the insect lipoid nerve sheath, and proved to be inactive as insecticides.

Gysin (1954) described the strong insecticidal properties of the related N,N-dimethyl carbamates of a variety of heterocyclic enols and several of these compounds. especially Pyrolan, Isolan, and Dimetalan, have been used commercially as insecticides especially for fly and aphid control. Kolbezen, Metcalf and Fukuto (1954) first called attention to the importance of the insulating properties of the insect nerve sheath in the insecticidal action of these carbamates and showed that although highly charged molecules such as prostigmine were inactive, spatially similar uncharged molecules such as o- and m-dimethylamino, methyl-, ethyl-, isopropyl-, and tert-butylphenyl N-methylcarbamates had considerable insecticidal action.

The development of Sevin¹/, first described by Haynes, Lambrech and Moorefield (1957) proved that insecticides of this class were potentially safe, inexpensive, stable, and of relatively broad spec-

^{1/} Trademark, Union Carbide Chemicals Corporation.

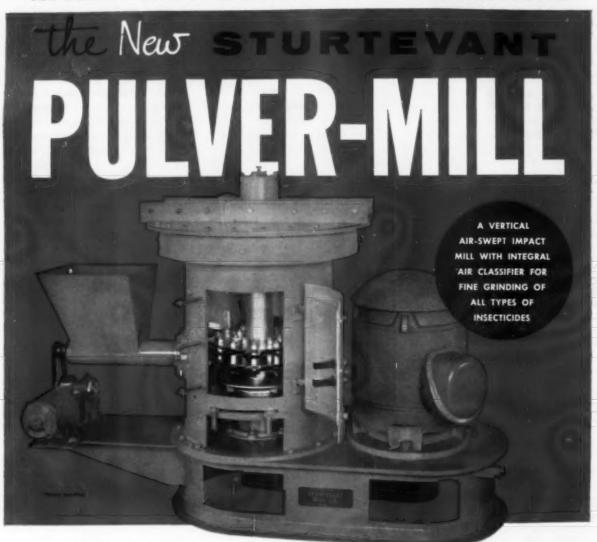
trum effectiveness. The production and use of Sevin in multimillionpound quantities by the Union Carbide Chemicals Corporation is an exciting success story. Sevin is a white crystalline compound, m.p. 142° C., relatively insoluble in water (about 0.1%) and somewhat soluble in organic solvents. It is relatively non-toxic to mammals, having an oral LD50 to the rat of 540 mg. per kg. and a dermal LD₅₀ to this animal of in excess of 5,000 mg. per kg. Equally important to its successful use as an insecticide is its rapid hydrolysis in the mammalian digestive tract to form 1naphthol which is detoxified by formation of water soluble conjugates such as 1-naphthyl glucuronate and largely eliminated from the body in the urine. Careful studies such as those of Gyrisco et al. (1960) have shown that Sevin fed to dairy cows at 450 p.p.m. is not absorbed and deposited in animal fat and that neither Sevin nor detoxication products are found in the milk. Therefore, Sevin may be used to treat a variety of animal forage products where the chlorinated hydrocarbons cannot be used, e.g. for the control of the corn earworm where the husks are used as cattle feed. Extensive field investigations with Sevin have uncovered an increasing number of uses and it is now widely recommended by state and federal authorities for the control of such insects as leafhoppers, thrips, scale insects, plant bugs, Mexican bean beetle, codling moth, apple maggot, red banded leafroller, pear psylla, Japanese beetle, oriental fruit moth, periodical cicada, corn earworm, cotton boll weevil, pink bollworm, cotton leafworms and bollworms, cotton fleahopper, and cotton leaf perforator. It is generally applied at 0.5 to 2 lbs per A. and is registered on more than 27 crops with residue tolerances ranging from 5 to 10 p.p.m. A tolerance of 25 p.p.m. is given for corn fodder and cannery waste. The principal limitations in its use are its considerable degree of specificity and especially its lack of acaricidal action, its high toxicity to bees, and its moderate solubility in suitable organic solvents which has limited its use in emulsifiable formulations.

Other newer carbamate insecticides are undergoing extensive field trials. Like Sevin, they are white, crystalline materials virtually insoluble in water. Meta-isopropylphenyl N-methylcarbamate has been used experimentally under the codes Hercules AC5727 and Union Carbide UC 10,854. It is extremely effective against a considerable variety of lepidopterous larvae, is active against a variety of other insects including cockroaches, bugs, beetles, and aphids, and has some acaricidal activity. A most surprising feature is its activity against adult mosquitoes, where it outperformed DDT, dieldrin, and malathion. Residues as low as 1 mg. per sq. ft. produced rapid knockdown

and kill of Anopheles for periods of more than 5 months (Gahan, LaBrecque, and Wilson 1961). It is also a good mosquito larvicide, but is not highly active against house flies. This compound has been shown by David, Metcalf and Winton (1960) to have effective systemic properties against lepidopterous larvae. Its principal disadvantage is its higher mammalian toxicity (oral LD, to the rat, variously given as 16 to 60 mg. per kg.). In this regard, the isomer o-isopropyl-phenyl N-methylcarbamate, although generally somewhat less effective against insects, has a much lower mammalian toxicity (oral LD₅₀ to the rabbit of about 300 mg. per kg.) and is potentially a useful insecticide. The closely related m-sec-butylphenyl N-methylcarbamate developed as Cali-

(Continued on Page 104)

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AGRICULTURAL CHEMICALS

Armour Construction Begins

Six different manufacturing plants are being constructed for Armour on a 1,200-acre tract. They will use common sources of power, water, and natural gas. Tons-a-day capacities will be ammonia, 260; urea, 50; nitrogen solutions, 150; nitric acid, 300; ammonium nitrate, 250; and ammonium phosphate, 500. Completion is scheduled for the first quarter of 1962.

CONSTRUCTION of a huge nitrogen fertilizer manufacturing complex was started officially April 25 in Cherokee, Alabama, for Armour Agricultural Chemical Co., Atlanta, Ga. The plant is part of a \$60,000,000 expansion program currently being undertaken by Armour.

Shown turning the first shovel-full of dirt are: from the left, E. W. Wilson, president of Armour & Co.; Governor John Patterson of Alabama; and William Wood Prince, Armour chairman of the board.





The Cherokee complex will consist of six different manufacturing plants on the one 1,200-acre site, using common sources of power, water, and natural gas. Tonsaday capacities of the six plants will be ammonia, 260; urea, 50; nitrogen solutions, 250; nitric acid, 300; ammonium nitrate, 250; and ammonium phosphate, 500.

The official ground-breaking ceremonies for the plant were attended by Alabama's Governor John Patterson, who said that the plant will "add substantially to the prosperity of Cherokee and of Colbert County." The plant is located on a 1,200-acre tract at Cherokee. in the northwestern part of the state, about 15 miles from the point where the corners of Alabama and Mississippi touch the southern edge of Tennessee. The site is on Pickwick Lake which was formed in the Tennessee River by TVA's Pickwick Landing Dam. The complex will occupy a fenced area of approximately 100 acres. Two miles of new roadway and three miles of railroad trackage are on the site and the Southern Railway will build a four-mile spur from Cherokee to the site. In addition the Tennessee Valley Authority will build a substation on the

M. W. Kellogg Co., New York,

a subsidiary of Pullman, Inc., is engineering manager and will act as coordinators for the entire project. Kellogg also will engineer, procure materials for, and construct the ammonia and urea plants, as well as be responsible for construction of all off-site facilities. The Chemical & Industrial Corp., Cincinnati, has the contract for engineering - procurement - construction of the nitric acid, nitrogen solutions, and ammonium nitrate plants, while Chemical Construction Corp., New York, will handle the work for construction of the ammonium phosphate plant. Completion is scheduled for the first quarter of 1962.

E. W. Wilson, president of Armour and Co., Chicago, said, at the ground-breaking ceremonies, that the new Cherokee facility is a "significant part" of Armour's continuing program of growth. In addition to the Cherokee plant, the program will include construction of a phosphate plant near Fort Meade in Polk County, Florida, and an extensive modernization program for existing fertilizer mixing plants. There are 34 of these plants located in the United States and Puerto Rico.

When Armour's current \$60, 000,000 expansion program is com-(Continued on Page 108)



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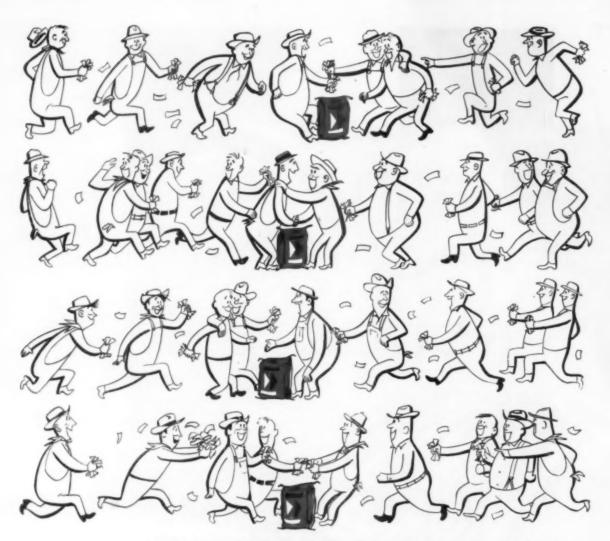


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Knowing Capabilities Of Multiwalls Helps Avoid Problems In Handling

Paper bags are manufactured under conditions which give them the necessary moisture content at time of shipment. During shipment, however, they may lose some of the moisture due to low relative humidity caused by drafts of dry air into the rail cars, extreme dry heat, extreme cold, or a combination of these.

Torture testing and other forms of research have proved that multiwall bags are capable of absorbing more punishment than they should receive. And the thrifty packer will see to it that his multiwalls are not pushed beyond their limits by chemical reactions within the product or by careless handling.

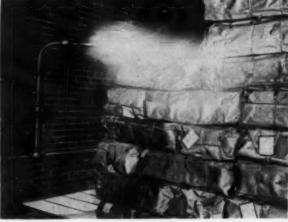
S OME of the problems occasionally encountered when packing fertilizer in multiwall paper shipping sacks could be avoided if, first of all, the packer became more familiar with the capabilities of the container and, secondly, followed the fundamental rules for handling multiwalls.

To many packers, these facts are self-evident. Others, however, have experienced needless difficulties because they either failed to take into account the interrelationship of product and package, or did not enforce the basic rules of multiwall handling. Of course, disregarding these two points will not necessarily mean a sudden breakdown in packing and shipping since the multiwall bag is a very serviceable container. More likely, the little, seemingly insignificant infractions of good handling procedures will show up in isolated instances of bag failures—a ripped bag here, a closure break there and weave separate courses to the overhead column. Compounded, however, these "insignificant" infractions can become quite expensive.

Chemical Changes

In some cases, failure to make packaging compensations for changes in the characteristics of the fertilizer being packed can jeopardize whole shipments. This was

Methods of maintaining proper moisture content in stored multiwalls range from simple floor-wetting (right) to rather elaborate methods like the steam valve (left). In any event, a humidity indicator should be placed in the storage room for frequent checks. Rags draped over the side of an open water barrel and open windows on rainy days also help.







aptly demonstrated during a recent investigation conducted by the Trade Extension Unit of Bemis Bro. Bag Company.

The investigators found that multiwall bag failures after packing certain fertilizers could be traced to the deterioration of bag structure caused by excessive free acid.

In one instance, investigators found that triple superphosphate had been packed "green" without compensation in packaging. Since triple superphosphate's free acid depends on the amount of curing, the packer normally stored it in curing bins for at least four weeks. However, the curing bins were depleted during the peak season and the "green" phosphate, containing a greater than normal amount of free acid, caused deter-

ioration of the cellulose bag structures shortly after packing. One packer averted the same problem by substituting heavy-mil polyethylene bags for his regular multiwalls when packing "green" phosphate.

Another type of fertilizer has caused similar packaging problems. This is the fertilizer of incomplete analysis containing no nitrogen, such as 0-20-20, made by mixing superphosphate and potash. Sulfuric acid, which may contain impurities, often is added to the superphosphate to convert a greater percentage of the phosphate to available P2O3. Then, the addition of muriate of potash introduces still another acidic source from the chlorine in this compound. Its combination with the free acid produces hydrochloric acid which, added to excess sulfuric acid, presents a dual threat to bag struc-

Again, plastic can be used to avert bag failure from this source. In this particular case, a 15-lb. polyethylene coating on kraft paper has proved effective. Acid-resistant thread, such as Bemis Golden-Ply, should, of course, be used for sewing, and long storage of filled bags should be avoided.

Empty Bag Storage

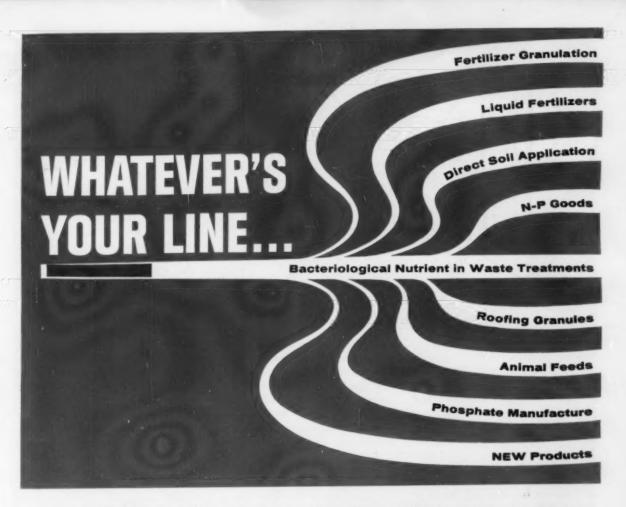
Multiwall paper bags are strongest and perform best when the moisture content of the paper is about 6 or 7 per cent. If the moisture in the paper is allowed to drop below normal, the bags will become weakened and brittle. This condition can lead to expensive breakage in handling and shipping.

Paper bags are manufactured under conditions which give them the necessary moisture content at time of shipment. During shipment, however, they may lose some of the moisture due to low relative humidity caused by drafts of dry air into the rail cars, extreme dry heat, extreme cold, or a combination of these and other shipping conditions. Improper storage conditions, too, often are responsible for robbing bags of the moisture necessary to give them maximum strength.

After some experience with paper bags, it is not difficult to tell when they have become too dry. One simple way is to test the bags for "rattle." Shake the bags briskly. If the bags "rattle" sharply, they are too dry for best performance and should be reconditioned before using.

Reconditioning can best be accomplished by storing the bags in properly humidified storage rooms so they may regain their normal moisture content. Paper bags which are in good condition should be similarly stored to maintain them at the proper moisture level.

Dried-out bags are one of the most common causes of trouble, and one easily avoided. Ideal storage conditions for keeping the proper 6 or 7 per cent of moisture in the paper call for a relative humid-



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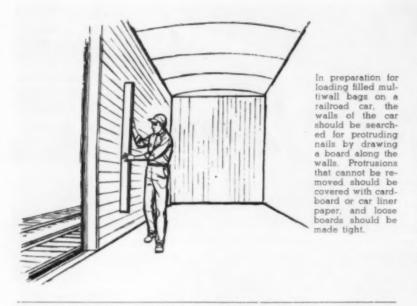
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ity of about 50 per cent at warm temperatures.

Handling Filled Multiwalls

Manual handling procedures, of course, should be designed to protect the workmen as well as the filled bags. If one man is lifting the bag, he should do so with his hands underneath it, preferably at diagonal corners. When two men are lifting a bag, they also should place their hands underneath it, supporting the four corners. A bag should be carried flat on the shoulder with the edge resting against the body.

On the negative side of manual handling methods, bags should not be gripped nor pulled by the corners. In the case of a gusseted bag, it never should be lifted or dragged by fingers inserted in the gussets underneath the sewn ends or in value openings. And, obviously, bags should not be dragged across the floor.

Hand trucks, chutes, and conveyers should be inspected to make sure there are no protruding nails or splinters. Old burlap, or a similar protective material, can be used to cover protruding edges that cannot be removed. Hand trucks should have wide, extended lips since narrow-blade lips can cut into the bag. Extensions can be added to trucks with narrow-blade lips. Bags should be placed flat on the

hand truck-never by pushing the blade under the bottom of a stack.

Wooden pallets may be used and, indeed, are becoming quite popular. On pallets, the filled bags should be stacked flat and even with the edges, with the end sacks interlocked.

Railway Car, Truck Loading

Adequate preparation of railway cars and trucks will curb much in-transit damage to multiwalls. Cars should be clean, dry, and free from protruding nails or other projections. They should have sound roofs, tight-fitting doors, and smooth floors, and walls. Dust and dirt should be swept from the walls, floors and ceiling, and pieces of crushed rock, grain and grit under the side boards should be removed. This residue from other types of shipments has a tendency to work out underneath the load and may slit a bag as cleanly as a razor blade would.

Loose nails, of course, should be removed. A straight-edge board about five feet long is useful in locating protruding nails when drawn along the car walls in a perpendicular position. In addition, loose boards in the walls and floor should be made tight, and protrusions that cannot be removed should be covered with cardboard or several sheets of liner paper.

Car liner paper is invaluable for covering walls and floors, especially if the car is in poor condition and is to be fully loaded, but this paper is hardly strong enough to properly cover storm doors. Here retaining strips should be used. These strips, designed to hold the bags away from the storm doors, prevent damage caused by slippage into the doorway and also allow the load to be easily inspected. Cars should be loaded by a pattern to minimize shifting during transit. There are, in general, four methods of loading-crosswise, brickwall, lengthwise and by key sacks. The latter method, developed by Bemis Bro. Bag Company, is based on the use of a row of "key sacks" to literally lock the load in place. This method can be used in combination with one of the other methods to lock the load just by the doorways or it can be used for the entire load.

Truck beds also should be free from dirt, debris, and protrusions. If long hauls are involved, or if the truck bed is in poor condition, car liner paper should be used. The best method of loading bags in open, stake-side, and enclosed trucks is flat, with ends parallel to the sides of the truck. Naturally, tarpaulins should be used to protect the bags from rain and other poor weather conditions.

Reliable Container

Multiwalls can take abuse, as practically any fertilizer packer can attest. The overwhelming acceptance of multiwalls for packing fertilizer is, in itself, testimony to the containers' reliability. This is, of course, no accident. Torture testing and other forms of research have proved that multiwalls are capable of absorbing more punishment than they should receive.

The thrifty packer will see to it that the container is not pushed beyond its limits by chemical reactions within the product or by careless handling. And for his precautions, he will receive even better service and even more economy from his multiwalls.**



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GENERAL OFFICE: 100 Church Street, New York 7, N.Y.

Financing And Advice By Dealers Influence Farmers' Fertilizer Use

South Carolina fertilizers dealers are experienced business men. Only four per cent have been in business less than ten years. More than one-half have been in business 30 years or more and 13 per cent have been fertilizer dealers for 50 or more years. Fertilizer is the major product line of 25 per cent of the dealers, who account for about 40 per cent of the total fertilizer sales.

Five per cent of dealers feel that the mark-up they charge is "adequate." Another 29 per cent feel that it is "barely adequate," and 35 per cent feel that their mark-up is "inadequate." (This latter group handles 44 per cent of the total volume of fertilizer.) Another 12 per cent of the dealers indicate merely that they are able to "break even" with the mark-up they charge.

→ HE results of a survey of fertilizer dealers throughout South Carolina indicate that these men play an important role in financing fertilizer purchases and in the farmer's decision-making process regarding fertilizer use. The survey was conducted by D. E. Crawford, associate agricultural economist, Department of Agricultural Economics, Clemson Agricultural College, Clemson, S. C. The results were compiled from answers to detailed questionnaires that were mailed to all fertilizer dealers in the state. Approximately 20 per cent of the dealers responded.

South Carolina fertilizer dealers are experienced business men. In response to the question "How long have you been a fertilizer dealer?", only 4 per cent of the dealers reported that they have been in business less than ten years. More than one-half have been in business 30 years or more and 13 per cent have been fertilizer dealers for 50 years or more. The average length of service in the business for all dealers is slightly in excess of 25 years.

Forty-six per cent of the dealerships are owned by individuals. Twenty-five per cent are partnerships, 25 per cent are corporations, and the remaining four per cent are cooperatives. On the basis of number of years in business, cooperatives were the youngest, with an average length of service of 10 years.

Fertilizer is the major product line of 25 per cent of the dealers who responded to the questionnaire. These dealers account for about 40 per cent of the total fertilizer sales, and their average length of service is 30 years. The dealers in this group, therefore, are larger than average and have been in business longer than average. The second major product line of these South Carolina dealers is farm supplies, followed by general merchandising. The average length of fertilizer dealerships is 30 and 31 years, respectively, for business in these groups. Cotton, feed, and coal, all are important items in the total business done by fertilizer dealers operating in South Carolina.

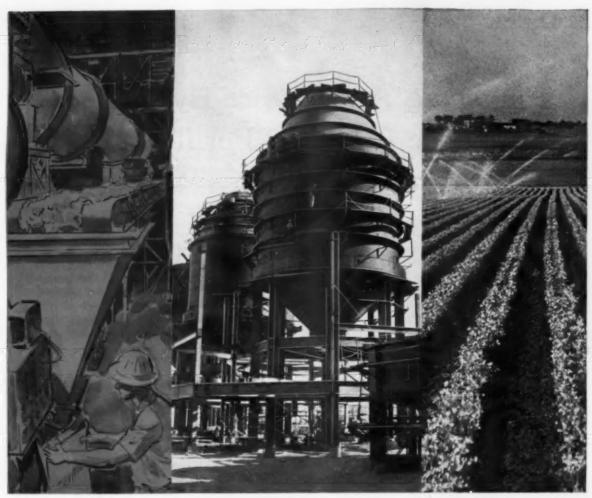
On the basis of number of years in the fertilizer business, those dealers whose leading sales item is feed are the youngest, with an average length of service of 19 years.

Among those dealers responding to the Clemson questionnaire, fertilizer sales volume ranges from \$1,000 to \$480,000 per year. One-third, however, sell less than \$10,000 worth of fertilizer, and two-thirds sell less than \$31,000 worth each. Actually, one-fourth of the dealers sold three-fourth of the fertilizer during the year ended June 30, 1960. On the average, fertilizer sales make up approximately 25 per cent of the total volume of all sales by these dealers.

The number of farmer customers who purchase fertilizer from any one dealer ranges from 9 to 1,500, with an average of over 200 customers per dealer. The average quantity of fertilizer purchased by each customer is approximately six tons.

Profit Margins

The gross margin of profit (mark-up from purchase price) re-



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ported by all dealers varies from one to 15 per cent for cash sales and from two to 50 per cent for credit sales. The average mark-up reported for cash sales is 7.69 per cent, and for credit sales 13,63 per cent. (These averages do not include a few dealers who reported charges which represented the cash price plus ten per cent plus an interest charge times the number of months credit was extended.)

Fifty-eight per cent of the dealers report that they realize less than ten per cent gross profit mar gins on cash sales. Twenty-nine per cent report ten per cent, and the remaining 13 per cent report more than ten per cent. Gross profit margins from credit sales are slightly higher than those realized on cash sales, with only 25 per cent of the dealers reporting that they charge less than ten per cent markup. Twenty per cent charge an even ten per cent, and the remaining 55 per cent charge more than ten per cent.

When asked about their mark-up charges, only five per cent of the dealers replied that the mark-up they charge is "adequate." Another 29 per cent feel that it is "barely adequate," and 35 per cent feel that the mark-up they charge is "inadequate." These dealers handle 44 per cent of the total volume of fertilizer. Another 12 per cent indicate merely that they are able to "break even" with the mark-up they charge.

As previously indicated, a great majority of the fertilizer dealers included in the survey are engaged in the handling of many and varied product lines in addition to fertilizers. Among other things, the dealers were asked to evaluate the role of their fertilizer operation in their overall plant.

- 3 per cent of the respondents said their fertilizer division is "a good money-maker in itself."
- 25 per cent indicate that it provides an important customer service.
- 34 per cent are of the opinion that it is essential for them to maintain their fertilizer department

More than half of the dealers responding to the Clemson questionnaire voiced considerable pessimism regarding their future in the business. Twenty per cent of the fertilizer volume, however, was sold by the 14 per cent of the dealers who classify business as "good" and "very good."

- in order for them to compete with other businesses.
- 50 per cent state that it is an integral part of their business organization.
- 46 per cent say that they have been "in business so long it's hard to give up."

(The sum of these percentages exceeds 100 since many dealers reported more than one answer.)

Eight per cent of the fertilizer dealers characterized their business as "hopeless" and 45 per cent said it is "poor." Thus, more than half of the dealers responding to the questionnaire voiced considerable pessimism regarding their future in the business. However, 33 per cent of them indicated that the fertilizer business was "average"; 8 per cent evaluated their business as "good"; and 6 per cent as "very good." Twenty per cent of the fertilizer volume was sold by the 14 per cent of dealers classifying business as "good" and "very good."

As a general rule, dealers who have been in business a shorter length of time reveal a more optimistic view of business conditions. For example, those who characterized their business as "very good" have been dealers for an average of 17 years, while those saying business was "terrible" have been selling fertilizer for an average of 34 years.

Services Performed

A fertilizer dealer performs many services other than "just a supplier of needed goods and services." As a matter of fact, South Carolina dealers are revealed to be engaged in a variety of public services ranging from educational programs for public meetings to test plot demonstrations and direct technical assistance to individual growers.

- 77 per cent of the dealers recommend the grades and analysis of fertilizer for various crops and pasture.
- 63 per cent recommend rates of application and placement of fertilizer.
- 32 per cent distribute published information on the subject.
- 20 per cent sponsor soils testing programs.
- 14 per cent sponsor test plots and pasture demonstrations.
- 14 per cent make available experienced personnel to assist farmers with their fertilizer problems.
- 5 per cent sponsor educational programs over radio, television, and at public meetings.

One can readily see, therefore, that a majority of the fertilizer dealers in South Carolina are doing more than just selling a physical product.

Principal "Gripes"

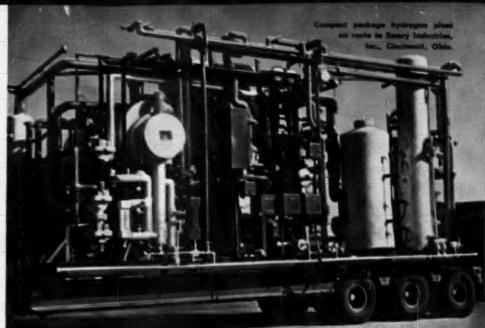
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(Continued on Page 103)

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SUBSIDIARY OF THE CHEMICAL & INDUSTRIAL CORP.

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Large-scale tests involving a whole host of the organophosphate and chlorinated hydrocarbon insecticides normally used as residual treatments proved ineffective when applied to barn and shed walls and fences. Also discussed are insecticide marketing and pest control in Russia.

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"When no one control measure proved highly effective," he pointed out, "research workers in the various states selected that practice which, under their local conditions, appeared to show the greatest promise and directed their efforts toward the further perfection of that particular practice. In all fairness, it must be said that most of them included in their studies at least some tests involving materials and methods being advocated by their associates in other states. However, all too often they inadvertently omitted one or more of the essential details prescribed by the principal advocate of the practice and therefore failed to get

comparable results. Thus, it is not surprising that none of the procedures proposed has universal acceptance — all of which reminds us that very often it is not so much what we do but how well we do it that counts.

"In the laboratory, topical application and panel type cage tests seem to show that the face fly is about as susceptible to most of the commonly used insecticides as normal house flies. However, large-scale tests involving a whole host of the organophosphate and chlorinated hydrocarbon insecticides normally used as residual treatments proved wholly ineffective when applied to barn and shed walls, fences, etc.

"Livestock sprays or dusts containing such residual toxicants as DDT, chlordane, toxaphene, malathion, ronnel or Co-Ral gave only temporary relief at best, and were soon abandoned by all investigators. Since the flies do not appear to possess resistance or any high degree of tolerance to these chemicals, it is difficult to say just why they were not more effective. Of course, these flies spend much time off the animals and breeding occurs largely out in the open pasture areas, which makes it possible for them to maintain disturbing populations despite a high mortality among those flies that come in

contact with the insecticides. Then, too, it is always possible that since this type of treatment has not been popular in recent years, its potential has not been fully exploited. The residual life or period of effectiveness of such treatments was never long enough to greatly interest beef producers and when such sprays containing DDT and related materials were banned for use on dairy cattle, they were almost universally abandoned."

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Application of syrup baits to the faces of cattle, he reported, has been the most successful way of controlling the face fly in Illinois. The simplest and most effective bait, he said, contained 75% corn syrup, 25% water, and 0.1% DDVP (O,O-dimethyl 2,2-dichlorovinyl phosphate). "Baits containing the water-soluble organophosphates DDVP and Dimethoate proved much more attractive than those

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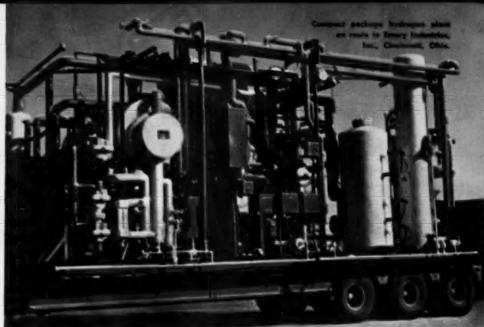
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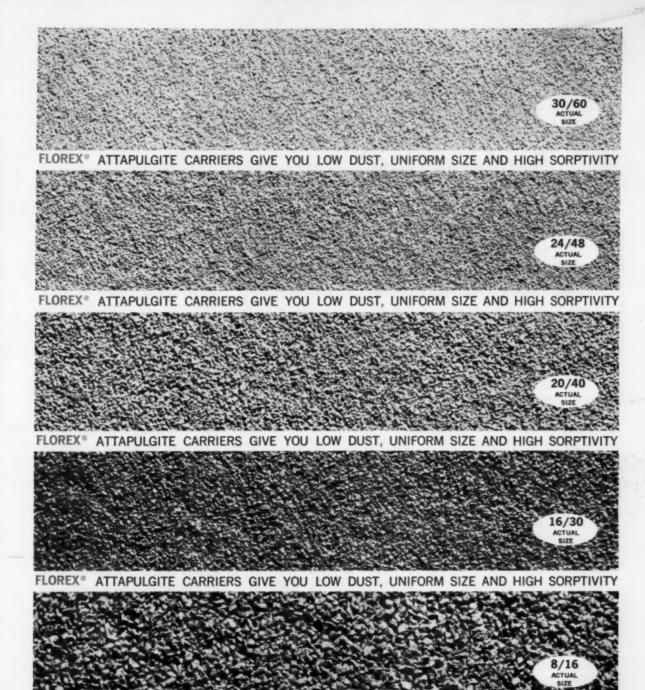
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Italian Fertilizer Producers Influence Rising National Economy

From 1955 through 1958, investments in the Italian chemical industry totaled \$742 million, with an annual average of \$185 million. The investments made in 1959, which have gone largely into new fertilizer plants, totaled \$234 million. The expanding production of chemical fertilizers is a main feature of the growth of the chemical industry and the entire economy of Italy.

THE expansion of production of chemical fertilizers in Italy is one of the salient features of the growth of the Italian chemical industry, which for several years has been playing a major role in the progress of the entire Italian economic system. In 1959, the chemical industry was the third largest contributor to the formation of the Italian national product, with a production valued at \$777,419,000 -a very large figure, indeed, if one considers the continuing need for heavy depreciation allowances in connection with the large investments in new plants and facilities.

From 1955 through 1958, investments in the chemical industry totaled \$742 million, with an annual average of \$185 million. The investments made in 1959, which have gone largely into new fertilizer plants, totaled \$234 million, according to figures presented in *Italy Presents*, an English language magazine distributed in the U. S.

The policy followed by the Italian chemical industry with respect to the production of fertilizers clearly is inspired by the basic criterion of building new facilities in the depressed areas of southern and insular Italy (Priolo and Porto Empedocle in Sicily, and Brindisi in Puglia, on the mainland) and of developing the most economical methods for the use of natural gas, both as a source of power and as a raw material.

Technological progress has been extremely fast. Since 1947, when the production indices were 70 for phosphatic fertilizers and 75 for nitrogenous fertilizers (taking 1938 = 100), tremendous improvements have been introduced, as regards phosphatic fertilizers, in the milling of phosphorites, and in the granulation of superphosphates, so as to offer to the domestic and international markets high phosphor-content superphosphates.

With regard to nitrogenous fertilizers, progress here has been even greater due to the large scale use of natural gas near the major gas fields, and to the utilization of urea.

The production of potassium fertilizers also has registered a considerable expansion due to the development of potash deposits in Sicily.

Over the last five years (1955 to 1959), the production of ammonium sulfate has risen from 151, 456 to 239,079 metric tons of nitrogen, that of ammonium nitrate from 56,708 to 146,365 metric tons; while the production of calcium nitrate reached 45,268 tons in 1959, that of sodium nitrate 1,032 tons and that of calcium cyanamide rose to 26,233 tons in the same year.

In the field of phosphate fertilizers, the production of mineral superphosphates (in terms of sulfur dioxide) decreased from 382, 194 to 338,143 metric tons, over the same five-year period; the production of bone superphosphate diminished from 4,428 to 1,841 metric tons.

As a result of the considerable increase in plant production capacity, Italian chemical fertilizers are being exported in increasing quantities to foreign markets. The principal outlets are the countries of Eastern Europe, the Middle East, and the Far East. Ammonium nitrate exports to Yugoslavia increased from 45,542 metric tons in 1955 to 81,280 metric tons in 1959; exports to Egypt increased from 10,701 to 96,825 metric tons in the same period. In the last few years, Bulgaria and Greece also have started importing Italian fertilizers. Ammonium sulfate exports to Greece, for example, increased from 45,396 tons in 1955 to 98,367 tons in 1959. Substantial quantities also have been exported to India, Pakistan, and Korea. The major

market for Italian superphosphates is Austria, which took 65,761 tons in 1955 and 40,534 tons in 1959. Subsequently, other markets, such as Bulgaria, Yugoslavia, and Hungary, have assumed major importance.

The total value of Italian fertilizer exports has increased from \$24 million in 1955 to \$51.5 million in 1959.

Major Producers

Four concerns share the bulk of Italy's increased fertilizer production. They are ANIC, the affiliate of the ENI Group (National Hydrocarbons Agency); the Edison Group; Montecatini; and Rumianca.

The ANIC plant, in Ravenna, produces 1,000,000 tons of nitrogenous fertilizers annually, in addition to about 90,000 tons of synthetic rubber. The plant was designed and built in just two and one-half years, a speed perhaps without precedent for such a giant plant. It occupies an area of more than 500 acres linked to the Adriatic Sea by a navigable canal. Ammonium . sulfate and nitrate were the first fertilizers produced at Ravenna, followed later by other fertilizers, as dictated by technical progress and new market requirements. The raw material for the production of ammonia-derived fertilizers is a mixture of hydrogen and carbon monoxide, which can also be produced, in case of stoppage of the acetylene plant, by partial oxydation of natural gas in a Texaco plant.

Part of the ammonia is converted, under pressure, into nitric acid, in an oxydation plant. The nitric acid is salified by a direct reaction with ammonia and mixed with limestone. Another salifaction plant is used for the production of ammonium sulfate. A new process in which gypsum is used as a raw material has been developed in Italy for use in this new plant. Basically, the process consists of a double-exchange reaction between the calcium sulfate, which is the gypsum constituent, and the ammo-

nium carbonate formed by the carbonation of ammonia solutions.

Both salifaction plants are equipped with ample space for warehousing the fertilizers. A completely automatized system of conveyor belts moves the fertilizers into the silos where they are bagged and to the docks for loading on ships and railroad cars. The existence of a direct access to the sea facilitates the shipping of the products both to the domestic and the foreign markets, particularly the countries of the Mediterranean, and also of the Middle and Far East. Work now is in progress for the enlargement and dredging of the Ravenna inland harbor, which will allow the use of ships up to 15,000 gross tons.

The Edison Group's most important fertilizer plants started production in 1958. Currently, they are concentrating on the production of compound fertilizers, in addition to the conventional fertilizers. With the development of production facilities completed for the time being, the Group has undertaken a program of mining exploration, the principal objective being to assure an adequate supply of raw materials. Excellent results are reported in the field of potassium salts, with the discovery of deposits in Sicily.

The Edison Group's principal fertilizer plants are located at Porto Marghera, near Venice (operated by Edison's Chemical Division and by Azienda Industriale San Marco), at Priolo, in Sicily, and at Vado Ligure. The Porto Marghera plants are producing chiefly nitrogen fertilizers and calcium cyanamide. In 1959, the pro-

duction capacity of nitrogenous fertilizers at the Porto Marghera plants reached 700,000 tons. The construction of the Priolo plant, designed chiefly for the production of compound fertilizers, was started in 1956, and production began in 1958. The plant is served by a 3,000 foot pier, completely mechanized for the loading and unloading of cargo ships and capable of handling 10-15,000-ton ships.

The Vado Ligure plant has been almost completely renovated and enlarged in recent years. It produces phosphate and compound fertilizer and, as are the other two Edison plants, it is excellently located with respect to both supply and outlet markets.

The Montecatini Company operates 40 plants for the production of powdered and granulated superphosphates. Their production, by far the largest in Italy, totaled 1,115,000 metric tons in 1959. Italy's' total nitrogen production capacity for agricultural and industrial uses is estimated to be 750,000 tons, with an actual production of 2,600,000 tons of nitrogenous fertilizers. Montecatini, with its production in constant development, produces about 40 percent of the total Italian figures.

Montecatini also has made a decisive contribution to the development of new plants and new production methods. The Fauser-Montecatini patents, of course, are in use all over the world. The company is doing major work in the production of urea containing 45 to 46 per cent nitrogen. On a world-wide scale, the 33 plants producing urea through use of the

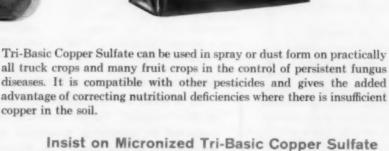
(Continued on Page 108)

As a result of the considerable increase in plant production capacity, Italian chemical fertilizers are being exported in increasing quantities to foreign markets. Ammonium nitrate exports to Yugoslavia, for instance, almost doubled between 1955 and 1959, while exports to Egypt increased nine-fold. The total value of Italian fertilizer exports has increased from \$24 million in 1955 to \$51.5 million in 1959.

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CINCE the introduction of the phosphate - type insecticides, much effort has been expended on the development of satisfactory dust formulations of these toxicants. Because of the inherent instability of the phosphates and their susceptibility to decomposition by the catalytic activity of surfaces of various solids, the formulation of adequate dry compositions has been extremely difficult. This instability has been particularly evident on mineral carriers that exhibit high-sorptive capacity. This factor has resulted in the use of carriers with lower sorptive capacities and other less attractive properties as the bases for dusts. For example, malathion, a major product of this type, has been prepared on many low-sorptive capacity carriers which give less decomposition but demonstrate poor flowability and application characteristics.

Considerable work has been carried out to determine the cause of malathion decomposition. The results reviewed here are based on studies undertaken to obtain comparative data on the decomposition of malathion when impregnated on low and high-sorptive carriers, and the effect of various additives on decreasing malathion decomposition when impregnated on high sorptive carriers.

Comparative stability data for 5% malathion dusts using various carriers showed that, of the samples tested, the attapulgite dusts were the least stable. Approximately 65% decomposition was obtained during the accelerated test for LVM* attapulgite, whereas for RVM** attapulgite there was approximately 47% decomposition. The value for decomposition reported for montmorillonite was 32%. Combinations of kaolinite with diatomite as carrier gave the most stable dust of three combinations tested (kaolinite with a diatomite: montmorillonite and an attapulgite; kaolinite and attapulgite). However, flowability measurements as conducted in the lab-

Glycols, Tall Oil Compounds Reduce Malathion Decomposition

The following discussion is a review of a paper by J. A. Polon and E. W. Sawyer, Jr., of Minerals & Chemicals Phillipp Corp., N. J., which was presented at the March, 1961 meeting of the American Chemical Society, St. Louis, Mo.

oratories of Minerals & Chemicals Phillipp Corp., indicated that this type of product exhibited poor flow properties. Poor flowability was also demonstrated by the dusts produced using kaolinite as the sole carrier.

Studies on the stabilizing efficiency of mono-, di-, tri-, and polyethylene glycols; propylene glycol; and alkyl ethers of mono-, di-, and triethylene glycols indicate that propylene glycol, Carbowax 200, and the butyl ether of diethylene glycol show the most promise of all the glycols and glycol derivatives tested. Use of 7% diethylene glycol is capable of changing the surface acidity of LVM attapulgite from less than .8 to 3.3, - however, it does not completely eliminate the malathion decomposition. It was then concluded that either the diethylene glycol did not decrease the surface acidity sufficiently to prevent decomposition, or that causes other than, or in addition to, surface acidity are responsible.

Clay properties, other than surface acidity, which were likely to cause or support the decomposition of malathion were considered. It has been shown that the presence of moisture in a carrier increased the rate of decomposition, but removal by drying of the carrier did not eliminate the decomposition. An alkaline condition on the clay surface as a cause of hydrolysis is a possibility when the heterogeneous nature of adsorbent surfaces is realized. LVM attapulgite, for example, shows surface acidity values (Ho) of less than 0.8 when dry, but when slurried in water, exhibits a pH of 7.5-9.0. Metallic

salts (calcium and magnesium) could possibly provide the alkaline condition on the clay surface. Therefore, an alkaline-site theory is proposed as a cause of decomposition of the P-S-C linkage by hydrolysis. The factors lending validity to this theory were checked by treating LVM attapulgite with a variety of agents which, because of their structure and active groups, would tend to interact with alkaline sites or free alkaline materials.

Over one hundred different additives at various concentrations were investigated for their stabilizing effects. Of the additives investigated, the tall oil compounds showed the most promise, considering both cost and efficiency of stabilization. The materials tested included: crude tall oils, distillation heads, distilled whole tall oils, distilled tall oils with high rosin acid contents, and distilled tall oils with high fatty acid contents.

The most efficient and economical stabilizers studied were found to be: two distilled whole tall oils, Indusoil M-28 and Acintol D; and Acintol FA2, a distilled tall oil fatty acid. As with the glycols, however, the tall oil compounds did not completely inhibit the decomposition. It was found also that the treatment of LVM attapulgite with varying amounts (up to 8%) of Indusoil had no effect on the surface acidity. This would indicate that the mode of stabilization is other than the neutralization of surface acidity, as is indicated for the glycol deactivators.

[°]LVM — low volatile matter (6-8% VM). °°RVM — regular volatile matter (12-14% VM).



Fertilizer Views and News



by Vincent Sauchelli

Dr. Sauchelli is a Consultant to the Agricultural Chemicals Industry.

Views on Complex and Metaphosphate Fertilizers

The fertilizer industry has become one of the very important branches of the chemical industry. It is rapidly advancing its chemical engineering processing and recent developments presage an inevitable trend toward more high-analysis chemical compounds for fertilizer use and will involve significant changes in future manufacturing and marketing organizations.

Complex Fertilizers

I N fertilizer literature, the term "complex fertilizer" is more and more frequently met with. Originating in Europe, the term has spread to other parts of the world. Is this another case of misnomenclature? Why do we in this industry seem to favor this sort of thing? We mis-name P2O3 as "phosphoric acid" and prefer to retain the system of oxides fashioned long ago by Berzelius rather than adopt more precise terms. Tradition and custom of the trade? Reverence for the past is excellent to a point, but there comes a time when a change to greater precision is desirable. That time is now.

Recently, in foreign journals, some correspondents with the editors question whether there is sufficient distinction between it and the commonly used names "mixed fertilizers" and "compound fertilizers" to justify the new designation. They claim it is a distinction without a real difference.

Those who introduced the term apparently intended to define

a compound fertilizer in which the ingredients are not merely physically mixed, but are chemically combined. The typical example is nitric phosphate, the product resulting when phosphate rock is acidulated with nitric acid. But in this case, the term "nitric phosphate" or "nitrophosphate" is accurately descriptive and to call it "complex" adds nothing but confusion. Surely, when phosphate rock is acidulated with other acids, such as sulfuric, the resulting product is as chemically combined as in the case of nitric acid, but it has never been necessary to call it "complex." The ammoniation of superphosphate or phosphoric acid results in a chemically combined material, but we have not considered it necessary to call the products "complex fertilizers."

The term "compound" has often been used in the industry to designate either chemically combined materials such as superphosphate or a physical mixture, the so-called "mixed fertilizer" of the trade. The term "straight" fre-

quently is used also to refer to a simple chemical compound such as ammonium sulfate or superphosphate. Sometimes the term "complete fertliizer" is used to refer to a mixture supplying N, P and K, the legally established trio of the industry. The distinctions have developed in the trade largely for reasons of commercial expediency. Usage over many years has conferred on them a sort of halo. Perhaps under the circumstances we shall have to make the best of the situation and accept the terms "mixed," "compound," "single," and "complex," despite the fact that they are illogical. We have been able to muddle through with "P.O." and "K.O" and "muriate" all these years despite the confusion they generate, so perhaps "complex" will likewise be accepted. But I, for one, believe the term is superfluous and should not gain currency in our industry. It would be interesting to have readers com ment on this subject.

Metaphosphates for Farm Use

Recently, two large fertilizer manufacturers-one in Scotland, the other in the United States-each announced a concentrated phosphate. The American product, designated as 8-40-0, is magnesium ammonium phosphate, its chemical formula being MgNH, (PO,) 3. It comprises 8% N, 40% P2O3 and 24% MgO. The Scottish product, potassium metaphosphate, (KP-O3) a, contains 60% P2O3 and 40% K2O, is non-hygroscopic, water-insoluble and non-caking; it is, however, a source of available nutrient potassium and phosphorus.

Several years ago, TVA introduced calcium metaphosphate, containing about 62% available P₂O₅. This was one of the first of the metaphosphates for fertilizer use. Unlike the superphosphates, the P₂O₅ in this compound is not water-soluble and it does not react with ammonia or ammoniating solutions. But by treating it with a mineral acid, it is possible to hydrolyze it and then process it with ammonia and other nutrient carriers to produce a high-analysis NPK-type of fertilizer.

Another metaphosphate, ammonium metaphosphate (NH4 PO₃), containing 17%N, 73% P₂ Os, has been prepared on a pilotplant scale at TVA. This compound is made by reacting ammonia with phosphorus pentoxide (P2O5) vapor at elevated temperatures (600° to 1000° F) and then hydrolyzing the intermediate compound to produce the metaphosphate. Its nitrogen and phosphorus are soluble in water to the extent of 70 to 80% and the P2O3 is 96 to 99% soluble in neutral ammonium citrate solution. Greenhouse tests indicate it is an excellent fertilizer. Undoubtedly, this ammonium metaphosphate will advance to the commercial production stage sometime in the future when the process becomes practicable.

Do these developments indicate a trend toward high-analysis orthophosphates and metaphosphates for farm use? The fertilizer industry has become one of the very important branches of the chemical industry. It is rapidly advancing its chemical engineering processing. I feel certain that these developments in concentrated phosphates presage an inevitable trend toward more high-analysis chemical compounds for fertilizer use and will involve significant changes in future manufacturing and marketing organizations.**

To Discuss The Future

George H. King, director of the Georgia Agricultural Experiment Stations, will discuss the future of agriculture at the 1961 summer meeting of the Georgia Plant Food Educational Society. The meeting is being held June 6 and 7 at the Wanderer Motel on Jekyll Island.

Also among the speakers are J. Fielding Reed, southern director of the American Potash Institute; Robert Wheeler, director of instruction, College of Agriculture, University of Georgia; and Samuel Tisdale of the Sulphur Institute.

Fisons In Joint Venture

Fisons Fertilizers Ltd., London, and Union Chimique Belge, Brussels, have formed a joint fertilizer manufacturing company to be known as Fison U. C. B., S. A. The company will build a plant at Zandvoorde, near Ostend, Belgium, with production of high-analysis granular compound fertilizers scheduled to start by mid-1962.

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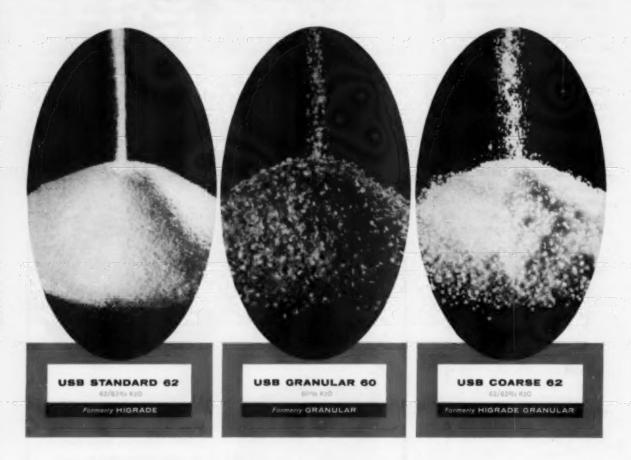
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Chemicals, Tools, And Advice Available At GLF's First Shopping Center Outlet

In addition to hundreds of lawn and garden chemicals and tools, the new GLF store in Hicksville, L. I., boasts a staff of more than 20 experienced employees who can provide authoritative answers to home owner's questions.

NE of the most recent farm supply organizations to take a major step towards serving the increasingly important market for home and garden products is the Cooperative Grange League Federation Exchange, Inc., Ithaca, N. Y. Earlier this spring, GLF opened its first home and garden store to be located in a shopping center. The store, which offers everything the growing number of suburban and rural home owners might need for growing lawns and gardens, is located in the Mid-Island Shopping Plaza in Hicksville, Long Island, New York.

The Mid-Island Plaza consists of nine major buildings and provides parking facilities for more than 8,000 automobiles. It serves a population in suburban Nassau and Suffolk Counties of more than two million people. The Home and Garden store is one of almost 90

fashion and service stores at the plaza.

The main building of the GLF outlet covers 12,000 square feet. A 10,000 square foot inside area, and a 2,000 square foot green house for outdoor nursery stock make up the bulk of the GLF facility. It is estimated that more than a half-million plants, flowers, bulbs, and seeds are on display, together with hundreds of lawn and garden chemicals and tools.

In addition to the home gardener's needs, the GLF Home and Garden Store handles lines of merchandise that are not handled by



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are sold. The entire store is arranged so as to make selfservice convenient, and a pleasant atmosphere for shoppers is created by the maximum use of light and color. The greenhouse is augmented by 10,000 sq. ft. of outside sales area.

other, smaller GLF units throughout Long Island. A complete pet shop, gift department, and food specialties department provide a field day for the impulse buyer.

Supermarket-type carts and check-out counters expedite shopping, while a staff of more than 20 experienced GLF employees are on call to provide authoritative answers to home owner's questions. Each of these employees is wellequipped with the knowledge necessary to answer any horticultural questions put to them. In addition, landscape consultants are available to provide more free advice. Other complimentary services offered by GLF to shoppers at the Home and Garden store include soil analysis, flower and plant arrangement service, lawn and garden tips, and a do-it-yourself home gardener's department. GLF's home and garden products are sold under the Squire Applegate brand name and include a complete line.

With stores already established to service farmers, and with 40 years of experience in supplying them with seed, fertilizers, pesticides, tools, and equipment, GLF has the background and facilities to meet all needs of the home and garden market. GLF operates four of the nation's largest feed mills, seven seed processing plants, 13 fertilizer and chemical plants, and eight regional hardware ware-

houses. The GLF hardware business handles thousands of items.

An indication that the Hicksville store will serve as more than an outlet for home and garden supplies, and will, in fact, provide a testing ground for future GLF home and garden operation is given by E. J. Biggie, manager of the GLF Home and Garden Department, who points out that the Hicksville store is "not necessarily the ultimate in such centers." Experience gained at this operation, he feels, will serve as the basis for planning future GLF home and garden outlets.

Figures contained in the 1961 Ford Almanac, and reported in the April issue of NAC News and Pesticide Review, indicate that there is plenty of room for home and garden stores. Last year, 40 million home gardeners spent \$4 billion in their pursuit of what now is termed America's No. 1 Hobby. Home

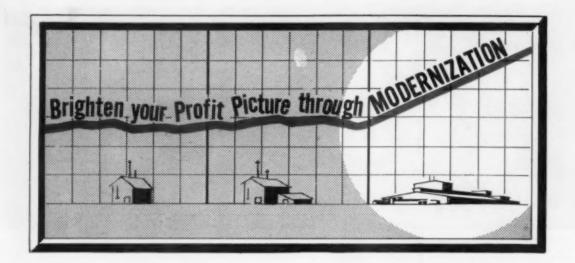
owners purchased \$935 million worth of shrubs and trees and spent \$2 billion for lawns and lawn care. Rose growers, alone, spent \$100 million

Willard O. Marshall, Jr., manager of the Hicksville store, has had more than 10 years experience with GLF retail outlets on Long Island. William H. Hibbitts, district manager for GLF, feels that the new store's location in a huge shopping center will prove to be beneficial to both GLF and the Mid-Island Plaza.

The unusual features of the store, he says, such as free information, charge accounts, gift wrapping, pet shop, food specialties, greenhouse, and florist, will provide the incentive for shoppers to continue coming to the Mid-Island Plaza and will attract shoppers already brought there by one or more of the other 90 stores at the plaza.**

The Mid-Island Plaza offers parking facilities for 8,000 automobiles and serves a population of more than two million people. Shoppers can park close to any store in the plaza.





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Production Production

Production Round Table



by F. T. Nielsson International Minerals & Chemical Corporation

Rotary Ammoniator and Granulator Technology

Part Two: Distributors

Within the plants of an individual company there can be found a variety of sizes of ammoniators. It is only by understanding the ideas behind the rotary ammoniator that field adaptation for each installation can be made. Conclusion of a two-part report.

THE device that adds the nitrogen-containing fluid either as anhydrous ammonia or nitrogen solution has been called a sparger by some and a distributor by others. In the early work (1), while testing the addition of anhydrous ammonia to triple superphosphate, it was found that the addition of ammonia in a decreasing ratio from the feed to the discharge end resulted in the greatest reversion of P₂O₃, with the least loss of ammonia.

On the other hand, the addition of ammonia in an increasing ratio from feed to discharge resulted in the least amount of reversion but the greatest loss of ammonia.

As a practical compromise, less ammonia addition at the ends of the distributor with more in the center yielded the best overall results. The curve distribution with some modifications has become generally accepted and the use of nitrogen solutions has not altered the basic concept of adding more ammonia toward the center of the distributor than at either end.

The use of acid to neutralize the ammonia above that which would react with the phosphates present in the bed was investigated a few weeks prior to the 1953 demonstration. About the only firm finding at that time was that fuming made it necessary that the acids be added below the bed.

Since the rotary ammoniator has been accepted commercially, more experimentation has been done with the placement of acid and solution distributors in relation to the axis of the drum, together with the direction of the entry of the fluids into the bed.

Before the bed in the ammoniator becomes damp, it has a low angle of repose and is displaced less toward the vertical than after ammoniation begins. The fume present during ammoniation may prevent good observation of the bed under ammoniating conditions (Figure 5). Some operators have mistaken the flattened position of the bed before ammoniation to be its operating position and have mistakenly placed distributors in the 4:30 to 5:00 o'clock

position under the impression that they would be in the deepest part of the bed. Actually, it has been found that a preferred position is to have the centerline of the distributors on a radius spaced 25 to 30° down from the horizontal in the 3:45-4:00 o'clock position (Figure 6). An added advantage of having the distributor in the higher position is that at rest, when the bed has slumped, it is relatively easy to examine the condition of the distributor.

Placing the distributor low slows down the bed movement before it has a chance to get started, resulting in poor absorption, local overammoniation and wet spots.

Where acid and solution are added simultaneously, it has been found that the least fume is generated when the acid and solution orifices are 180° apart, with the plane of the orifices lying in a circle concentric with the shell. To increase the retention time of the ammonia, solution streams are directed against the rotation of the bed, and to minimize corrosion of the distributor, acid streams are

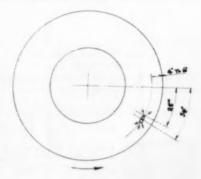


Figure 6

directed parallel to the rotation of the bed. However, despite the best anti-fume position, solution orifices directed into the bed become plugged if it is not a routine practice to admit compressed air into the solution distributor whenever the flow of solution is stopped. As a result, a satisfactory compromise appears to be the direction of the solution orifices toward the wall of the cylinder.

Directing the acid flow against the wall of the cylinder appears to increase the hardness of the crust that generally forms on the interior wall.

It has been reported (5) that if the orifices are drilled in a spiral pattern encircling the solution and acid distributors, localized areas of intensive reaction (hot spots) are minimized, with a concomitant decrease in fume evolution. The spiral pattern should ensure also that a large number of orifices will remain open.

The longitudinal distributors described above probably are the most efficient means of adding solution and acid to an ammoniator. Their chief disadvantages are that (1) they hinder the rolling action

of the bed; (2) the orifices tend to enlarge from the outside because of the secondary reactions that occur during ammoniation; (3) damage requires replacement of a completely new distributor; and (4) severe enlargement of one orifice results in excessive additions of solution or acid at one spot, leading to severe fuming, wet spots and possible flash fires.

A compromise "downcomer" distributor is suggested (6) that overcomes the disadvantages mentioned above, although there may be some sacrifice in efficiency.

The downcomer distributor is illustrated in Figure 7. It consists of a horizontal header positioned above the bed. Orifices are drilled in the header at 9 inch to 12 inch intervals. A pipe is welded around each orifice to direct the flow of liquid. The pipe terminates in a coupling that is positioned just above the top of the rolling bed. Up to this point the piping is made of stainless steel. Extra-heavy black iron pipe nipples are inserted into the stainless steel coupling to direct the solution under the bed. Best results have been found when the solution nipples are "fishtailed," as

shown in Figure 7, but that is not necessary.

The first result of installing the downcomer distributor is an increase in the rolling action of the bed and a decrease in the power required to operate the ammoniator.

The next result is the decrease in maintenance of distributors. Because the orifices are not subject to bed reactions, their life is indefinite. If an iron nipple wears or breaks, it is a simple matter to install a new one at little expense.

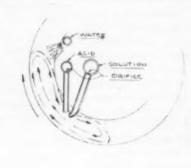
In addition, if a nipple breaks during operation, only that part of the total solution or acid flow is directed into the bed that is regulated by the corresponding orifice. This is in contrast to the longitudinal distributor that discharges the entire flow in one spot if a break occurs. Suitable proportions are a two inch header for solution with three-quarter inch downcomers, and a one inch header for acid with one-half inch downcomers.

Easy change of distribution is another advantage of the downcomer distributor.

For ammoniating solid phosphates, it has been found best to use an unpaired solution downcomer at the feed end, followed by paired acid-solution downcomers for the remainder. For ammo phos grades, it has been found best to use acid-solution pairs throughout. For 1-4-4 ratios, one-half of the downcomers may be used to develop a small area of high temperature. With 1-1-1 ratios, all the downcomers are used to dissipate the heat of reaction. Any downcomer not in use is closed off by removing the iron nipple and inserting a pipe plug in the coupling.

The premise that acid and solution will flow out of the various orifices in proportion to the area of each orifice holds only if the header pipe is full. To insure that the header pipe remains full, the sum of the areas of the orifices should not be more than one-half of the cross-section area of the header. Failure to follow this rule

(Continued on Page 106)



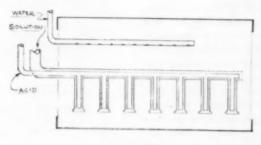
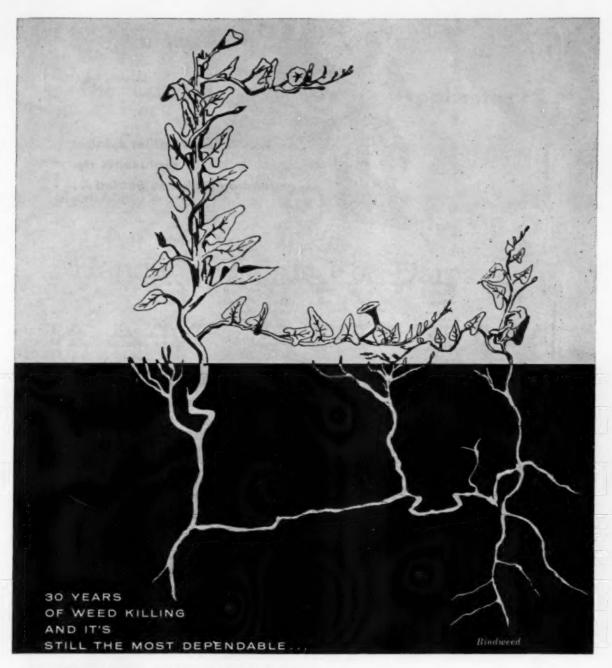


Figure 7



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Some Helpful Hints

Handling Claims For Damages

If a claim for damages is filed against an applicator, it should be examined at once. A friendly and sympathetic talk with the injured party many times will lead to a prompt settlement of the claim without the necessity for court action. The best way to prevent litigation, of course, is to be as careful as possible in the application of chemicals.

THERE are a number of ways in which people can get into trouble through the use of chemicals on crops. For the most part, legal problems connected with the use of herbicides or any other type of agricultural chemical are those connected with damages of some sort. As a rule of thumb, the user of the chemical is responsible for the results of his actions.

If the owner's own pine trees are killed, that is all right. If the applicator is foolish enough to apply a chemical without taking adequate precautions to safeguard his person and he sustains severe irritation of the eye, or even dies from the result of the contact, that is his business. The trouble becomes much more complex when another party is involved. When these incidents occur, and sooner

or later they will occur unless particular care is taken, it makes very little difference whether it was an accident, whether it was done on purpose, or whether it was almost an act of God—that is, one of those things that just could not have been prevented.

The person who was using the chemical is financially liable for the damages which have been incurred. It is advised that a friendly settlement be made whenever possible in matters of this kind. Experience indicates that no one really wins a lawsuit unless it is the lawyer, and sometimes it is questionable how he really comes out in the long run. In one case which may be cited—this involved chemicals in chicken feed—settlement was made for \$2,500. It was reported that the attorney for the

plaintiff received \$1,500 and the owner of the chickens was given the remaining \$1,000. Judging from the time it took and the amount of expert testimony that was presented by the feed company, it probably cost the company \$10,000 to defend the case. Who won? It was not the feed company, and it certainly was not the chicken farmer. So when damages occur, it is strongly recommended that the persons involved get together and try to work out some reasonable settlement.

In many cases, of course, there will be people who think that this is a very easy way to make a crop. They may say, "Well, the old Gulf Land Company has a lot of money, and they're a big company. I think maybe we ought to help them spend some of it." Such people make claims for damages that are false and completely unjustified. That does happen; we may as well recognize it. In such cases, it certainly is not recommended

This article is based on a talk by Ernest A. Epps, chief chemist, Louisiana Department of Agriculture, at the 9th annual Forestry Symposium, held last year at Louisiana State University. The full text of this and other papers has recently been published by the University in a book, "The Use of Chemicals in Southern Exprests"

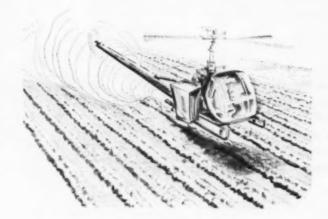
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that anyone be paid off. That would encourage similar attempts in the future. As a rule, however, when legitimate damage claims arise as a result of an operation, it is much better to settle them quickly, in a friendly way, and be through with them. If they cannot be settled in this way, court action is required.

The best way to prevent litigation, of course, it to be as careful as possible. The more care that is exercised, the less likely are claims to arise and the better is one's position to ward off unjust or fraudulent claims.

One point that may be worth stressing is that if a claim is filed against an applicator or chemical firm, it should by all means be examined at once. If a company representative will talk to the injured party in a friendly manner and show real concern (after all, his four acres of cotton is important to him), a great deal may be accomplished. The company may

own a million acres of pine timber, and four acres of cotton does not seem like much beside this, but the farmer's cotton is important. It may be worth only fifty dollars, but it is all he has in some cases. So, a lot of grief may be saved at times by trying to adopt a sympathetic and understanding attitude toward the people who might make claims.

When and if claims are made. an immediate investigation should be carried out. All the facts should be collected, as well as all the evidence, including names, dates, and addresses. People's memories fail, witnesses become unavailable, and many other things can happen. Even after the initial investigation, the progress of the crop should be followed. The crop may have a few leaves curled up but no real damage done. Or the complainant may abandon his crop. In that case the defendant is in a much better position. If damage occurs to the crop, unless obvi-

ously it is a total loss, the damaged party is supposed to care for his crop to the best of his ability in order to salvage as much as possible. This is the same reasoning that requires a person to call the fire department if his house catches on fire. He can't just let his house burn down and then tell the insurance company that he wants a new house and furniture. It is important in damage cases that the damaged party try to protect and recover as much of his loss as possible. In some states-and this seems to be a growing practice - there are requirements that notice of damage must be given within a certain period of time after damage occurs. This gives the defendant an opportunity to protect himself.

Although there now are legal restrictions that govern the application of most chemicals, the development of additional restrictions is pretty much up to the

(Continued on Page 101)

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Agavenco Acquires Span Flow



Agricultural Aviation Engineering Co., Santa Clara, Calif., has purchased the patent and manufacturing rights for the Span Flow aircraft dusting equipment from Nissen Aviation Products, San Jose, Calif.

Included in the Span Flow system is a supplementary wing onto which dust and other agricultural chemicals are metered. Aerodynamic forces on this wing spread the material uniformly across its span and the material then is carried downward in the built-in downwash of the system.

Improved Snow Offered

Snow Aeronautical Co., Olney, Texas, manufacturer of the S-2A and S-2B agricultural aircraft, is offering a new version of the S-2B. Although the wings, empennage, and landing gear have not been changed, the modified B-model is equipped with a new fuselage which bears little resemblance to the original.

The cockpit is 17 inches farther forward and three inches higher. The engine has been lowered three inches, giving the pilot increased visibility. In addition, the fuselage now is metal covered, with removable top, bottom, and sides.

The cockpit area has been completely sealed off from the rest of the fuselage by means of a metal "shell." The instrument panel has been lowered somewhat and set at an angle, making it more readable from the pilot's normal viewing position. Fuel capacity in the new model is increased from 44 to 70 gallons, giving the S-2B a working range of three to four hours, depending on whether it is powered with an R-985 or R-1340 engine.

Heads Colorado Aerial Group

Clarence Tietmeyer of Grover, Colo., has been elected president of the Colorado Aerial Dusters and Sprayers Association. He succeeds Norman Kramer of Alamosa.

Other officers elected include Samuel Flint, vice president; Eldred Bristol, secretary; and Loren Inman, treasurer.

13 hp Potts Mist Blower

S. Frederick Potts, Crawford, Miss., is offering a mist blower that is powered by a Wisconsin 4-cycle, 13 H.P. engine. The unit delivers an air volume of 4,000 cfm: the velocity of which can be regulated at from 50 to 200 mph.

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by Kelvin Dorward

Insect Conditions During April Indicate Need For Control

THE greenbug continued to cause damage in parts of Oklahoma and Texas during April. The insect was of concern throughout Oklahoma by the middle of the month, with spraying rather general. Populations, however, were showing some decline in the southwestern part of the State late in the month, but serious damage still was occurring in isolated fields of small grain in various areas.

In the Panhandle and Red River counties of Texas, greenbug population ranged from light to heavy. Counts as high as 5,000-6,000 per foot were recorded in several panhandle counties. Controls gave good results and wheat was reported as looking good.

By the latter part of April, greenbugs were appearing in the extreme southwestern portion of Missouri. Counts ranged from zero to several hundred per foot of row, with one field in Jasper County having a count of 2,000 per foot. Damaging infestations of the insect were reported from southern Crowley and Summer Counties, Kansas. Counts varied from less than one to 50 per foot of row in other Kansas counties reporting. Arkansas, New Mexico, Nebraska, and Colorado reported light populations the latter part of April.

Populations of the pea aphid were beginning to build up over a wide area of the country by late April. The insect was reported as being light on alfalfa in Delaware, Maryland, and Virginia, but evidence of increases were noted. In Illinois, counts in clover and alfalfa ranged from 26 to 130 per square foot. Counts were light in

Arkansas, Kansas, Missouri, and Nebraska, but ranged from moderate to heavy in Oklahoma.

Pea aphid populations ranged from 1,200-1,500 per sweep on volunteer Hubam clover in Bell County, Texas. On vetch in several other central Texas counties, counts ranged 500-1,000 per sweep. Widespread infestations of varying degrees on leguminous crops were reported from other sections of the State. In New Mexico, heavy, spotted infestations damaged alfalfa in Chaves and Eddy Counties, but populations were on the decrease in northern Dona Ana County. The aphid was heavy on alfalfa throughout Arizona and in localized areas of Utah. Populations varied widely in Nevada. Generally, counts were light, but in one field near Reno, populations of several thousand per square foot caused heavy damage.

The pea aphid was building up in the Clearwater River area of Idaho much earlier than observed in the past few years. Populations in all fields checked were much above those reported for the same time in 1960, and indications were that there was some overwintering in the nymphal or adult stages.

By the latter part of April, the alfalfa weevil was rather active in both eastern and western United States. In Delaware, larval numbers were on the increase in Sussex County, with injury more noticeable in untreated alfalfa. Heavy injury was noted in a Prince George County, Maryland, location, but populations were light in other sections of the State. In Virginia, first infestations were found in

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division. U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

fields which had not been treated in the fall of 1960. Many infestation have been treated this spring with good results. Populations in Morgan County, Georgia, averaged 55 per sweep, but fields treated last fall averaged one larva per 10 sweeps. In South Carolina, the weevil has destroyed most of the alfalfa crop in Cherokee County. The portion of the crop remaining had received fall treatment. Twelve Tennessee counties were reported infested by the alfalfa weevil for the first time during April.

Alfalfa weevil adult feeding was noted in some fields of alfalfa in Colorado and it was expected that controls might be needed after the first cutting of hay. In Goahen, Laramie, and Platte Counties, Wyoming, adults averaged one per square foot of alfalfa crown. Controls were necessary in localized areas of Utah and it was estimated that, by late April, 75 percent of the alfalfa had been treated in Wasatch County. Weevil populations were low in Idaho, and light activity was reported from Nevada and Oregon.

Mites were causing damage to wheat in local areas of Kansas and were increasing on that crop in Colorado. Light populations were reported from Oklahoma and Nevada.

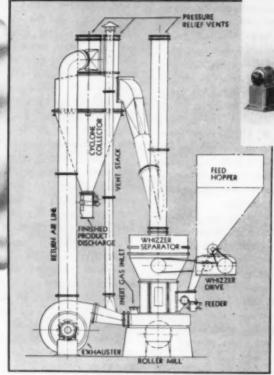
Some cotton insects were beginning to show activity by the

(Continued on Page 107)

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by Paul Miller

Control Of Fusarium Yellows Of Celery By Soil Fumigation

ELERY varieties resistant to attack by the soil-borne fungus Fusarium oxysporum f. apii usually are planted where Fusarium yellows is a problem. Colorado growers, however, prefer certain susceptible varieties, according to Ralph Baker and Douglas J. Phillips, of Colorado State University, and Charles Martinson, of Oregon State College (1). Baker and his associates tried soil fumigation with trichloronitromethane (chloropicrin) and a proprietary formulation containing 50% chloropicrin and 50% chlorinated C3 hydrocarbons including 1,3-dichlo-1,2-dichloropropane, ropropene, and related chlorinated hydrocarbons (Nemex, formerly Morton Chemical Company EP 136), at the Colorado State University Experiment Station in attempts to find a practicable chemical means of controlling the disease. The chemicals were injected at the rates of 470 and 790 pounds per acre into sandy loam soil in two fields. The treatments were rated on the basis of plant weight and incidence of Fusarium yellows at harvest. Results showed that effectiveness was correlated with the previous history of the disease. In one field, where losses had been slight, all treatments resulted in statistically highly-significant increases in plant weight and decreases in incidence of the disease. In the other field, where losses had been heavy, only chloropicrin at the higher rate was effective. Baker and his associates concluded that Fusarium vellows of celery could be controlled by soil fumigation with Nemex or

chloropicrin, but that choice of chemical and rate of application would depend upon the amount of the disease previously present. They stated, however, that use of the fumigants, even at the lower rates of application, might not be economically feasible.

Evaluation Of DBCP

During 4 years of experiments, in cooperation with the Georgia Agricultural Experiment Station, J. M. Good (3), of the Crops Research Division, Agricultural Research Service, United States Department of Agriculture, studied the effectiveness of various formulations of 1,2-dibromo-3-chloropropane (DBCP) for control of the root-knot nematode Meloidogyne incognita incognite, and the reaction of several different truck crop plants to the chemical. Under the conditions of the experiments, which differed from year to year, appropriate dosages usually resulted in satisfactory control of root knot. Some kinds of plants were injured. Tomato plants, especially, showed evidence of phytotoxicity in every test with DBCP. The injury usually was slight enough to have escaped notice, except under the controlled conditions of the tests, according to Good, who remarked that on heavily infested land the improved plant growth resulting from nematode control would probably mask DBCP injury to the roots. Preplanting applications tended to give slightly better control and to cause less injury than applications made at planting time. Good listed depth of placement,

This department, which reviews current plant disease problems, is a regular feature of AGRICULTURAL CHEMICALS. The comments are based on observations of collaborators of the Epidemiology Investigations, Crops Protection Research Branch, USDA, Beltsville, Md.

method of formulation, soil moisture, soil temperature, timing of application, and kind of plant as possibly contributing to injury from DBCP, but concluded that the fundamental factor evidently was the rather low volatility of the chemical. To minimize injury, he advised placement of the chemical deep enough to be out of contact with seed or plants, minimum rates of application, avoidance of application in cold or wet soils, and use as long before planting as possible. Of sourse, DBCP should not be used for crop plants known to be sensitive to it.

Evaluation Of Treatments

J. F. Darby (2), of the Central Florida Experiment Station, Sanford, Florida, compared a number of chemicals used as soil treatments for effectiveness in controlling soil-borne fungi and nematodes that attack tomatoes, as well as weeds and grasses common in tomato plantings. Rates and methods of application differed according to chemical. Darby obtained excellent control of the damping-off fungi Pythium spp., Pellicularia filamentosa [most common in the imperfect stage, Rhizoctonia solani], and Pellicularia [Sclerotium] rollsii, of unspecified weeds and grasses, and of the root-knot nematode Meloidogyne incognita incognita, with vaporized methyl bromide, methyl bromide in solution (Brozone), and a fortified methyl bromide-chloropicrin mix-

ture (Trizone). Good control resulted also from applications of 3,5-dimethyl-1,3,5, 2H- tetrahydrothiadiazine-2-thione (Mylone 50% dust); sodium methyldithiocarbamate (Vapam); 1,3-dichloropropene-1,2-dichloropropane 10%, allyl alcohol 50%, and emulsifiers 10% in a commercial formulation (Kildrench No. 3); emulsifiable D-D; and 85% acrolein (Aqualin). All treatments increased the yield of marketable fruit. No treatment significantly reduced percentage of fruit rot caused mostly by Pellicularia filamentosa and P. rolfsii, although, as mentioned previously, seedling attack by these fungi was well controlled. One month after treatment, the parasitic-nematode population in all treated plots was practically nil. Subsequent increase in populations varied with chemical and type of nematode. At harvest time, stubby root nematodes (Trichodorus chrietei) were fewer and root-knot nematodes were a great deal more numerous in plots treated with Vapam, Mylone, Aqualin, and Kildrench No. 3 than in plots treated with the methyl bromide formulations.

Improving Fruit Tree Growth

Apple trees planted in soil chemically treated at planting time showed increases in growth amounting to as much as 40%, in experiments reported by P. M. Miller (4), of the Connecticut Agricultural Experiment Station. Most of the extra growth probably resulted from control of root-rotting fungi, particuarly Rhizoctonia solani, rather than from control of parasitic nematodes, according to Miller. Effective chemicals included two fungicides, 8-hyroxyquinoline sulfate (oxine sulfate) and 20% pentachloronitrobenzene (PCNB; Terraclor, and a nematocide, 1,2dibromo-3-chloropropane (DBCP) in a 50% emulsifiable concentrate (Nemagon EC-2). Both fungicides are known to be rather specific for use against R. solani and neither possesses nematocidal properties so far as known. The nematocide DB-

CP, on the other hand, has been shown to be capable of inhibiting growth of R. solani. The ineffectiveness of the other two nematocides tested, namely 10% granular 3,4-dichlorotetrahydrothiophene 1. 1-dioxide (PRD), and 75% emulsifiable concentrate of O-2,4-dichlorophenyl O-O-diethyl phosphorothioate (VC-13), provided additional evidence of the major role of fungi as the cause of root injury. Nematodes present in the soil used the experiments included Pratylenchus penetrans and P. pratensis, Xiphinema americanum, paratylenchus sp., Tylenchorhynchus sp., and Rotylenchus sp. Miller considered that to affect growth of apple trees significantly, nematode injury to the roots must be accompanied by infection by R. solani. He discussed several factors that might have been responsible for the relative ineffectiveness of the nematocides, but concluded that most

of the increased growth obtained in the test was due to control of root-rotting fungi. Both nematodes and fungi, however, could be controlled by treatment with both nematocides and fungicides, at little extra cost and, probably with considerable gain.

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- (2) Darby, J. F. 1961. Evaluation of treatments for the control of soil-borne pests of tomato. Plant Disease Reporter 45: 58-61. January.
- (3) Good, J. M. 1961. 1957 1960 evaluation of DBCP application rates, time of application, and phytotoxicity on selected crops in south Georgia. Plant Disease Reporter 45: 46-50. January.
- (4) Miller, P. M. 1961. Improving growth of fruit trees by treatment with nematocides and fungicides at time of planting. Plant Disease Reporter 45: 42-44. January.

Watermilfoil Control Report

In a progress report on the control of Eurasian watermilfoil in Chesapeake Bay, presented at the Ianuary 6 meeting of the Northeastern Weed Control Conference, John H. Stennis, U. S. Fish and Wildlife Service, Laurel, Md., and Vernon D. Stotts, Maryland Game and Inland Fish Commission, said that the manner in which Eurasian watermilfoil completely dominates most areas in which it grows has resulted in a severe weed problem.

They reported that invasion of Eurasian watermilfoil in fresh and brackish waters from New York to North Carolina and Tennessee affects diversified interests including boating, sport and commercial fishing, and waterfowl hunting. Preliminary studies on herbicidal control of this problem plant indicate that 2,4-D granules applied at the rate of 20 to 40 pounds acid equivalent per acre give effective results in tidal areas. Time for treatment should be (a) when the plant reaches the water surface at low tide and before it flowers, (b) when the water temperature is above 20°C., and (c) when the tide is ebbing and near the period of low water slack.

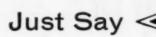
Future studies are to be directed toward refinement of control techniques and evaluation of the toxicological effects of herbicides on fishery resources.

Strawberry Insect Control

The control of insects on strawberries is the subject of a brochure recently published by the Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y. "Thiodan for Strawberries" outlines to growers the pests controlled by Thiodan insecticide and recommendations for its application.

The brochure describes control measures for the three major strawberry pests – cyclamen mite, strawberry aphid and meadow spittlebug. It differentiates between the application techniques required for cyclamen mite in western areas as compared with eastern states and also details a pre-plant dip method for curbing this insect in transplants.







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Aerial view shows the complete Phosphoric Acid Plant of The Bunker Hill Company at Kellogg, Idaho. Three 35' Dorr Storage-Clarifiers are seen in the foreground.

SO₂ from zinc plant opens way for phosphoric acid production at

THE BUNKER HILL CO.

Another example of Dorr-Oliver engineering

Operated in conjunction with the Company's important zinc reduction facilities nearby, the new Phosphoric Acid Plant of The Bunker Hill Company, Kellogg, Idaho, was constructed in 42 weeks, put into production in January this year, and very quickly achieved capacity and efficient operation. The plant has a design capacity of 130 tpd of 54% P2 O3 product acid (70 tpd P2 O5).

The Dorrco Strong Phosphoric Acid Process is used, utilizing Western phosphate rock and sulphuric acid manufactured from SO₂ gas from the zinc plant roasting operation. Complete engineering, plant design, purchasing of equipment and supervision of erection and initial operation were handled

by the Dorr-Oliver organization.

Selection of Dorr-Oliver was based on over 40 years of experience in constructing wet process P2 O5 and complete fertilizer plants throughout the world. For information on the complete range of D-O engineering services available to the Fertilizer Industry, write to Dorr-Oliver Inc., Stamford, Connecticut.



Top view of newly-developed Dorr-Oliver Single Tank Reac used in this plant for the first tim



The entire plant operation is controlled from this central





Washington Report



by Donald Lerch

Industry Is Urged To Contribute More For Research

DOES the Federal Government or industry spend more on agricultural research?

If your own research budgets haven't given you the answer as yet, you can take if from Dr. Byron T. Shaw, Administrator of USDA's Agricultural Research, that industry pays the lion's share of the nation's agricultural research bill.

In testimony before the House Appropriations Subcommittee on Agriculture, Dr. Shaw disclosed that of the total \$541 million expected to be spent for this purpose in fiscal 1961, industry's share will be about \$280 million, or 52 percent, State contributions will be \$116 million or 21 percent, and the Federal share will be \$145 million, or 27 percent.

While the amount of industry research is substantial, says Dr. Shaw, he would like to see more of it. In particular, he would like to see even closer research relationships between USDA and industry. According to a survey he had made in USDA, industry now is contributing about \$7.7 million in direct support to USDA research programs each year. Much of this is in the form of furnishing specialized facilities, equipment, material, and personnel.

USDA feels that industry contributions not only speed research and enable the Department to cover a wider range of research projects, but they also tend to speed adoption of research results, thus speeding agricultural progress. Industry can contribute to cooperative research in the form of funds, facilities, materials, personnel, de-

velopmental consultation, information, and data.

As of now, about \$1 out of each \$10 the USDA spends for production research comes from industry; about \$1 of \$3 USDA spends for utilization and marketing research is paid by industry.

Anyone visiting our farm lands today can see the vitality of American agriculture that has resulted from these research efforts. Agriculture Secretary Orville L. Freeman says this is "our number one success story." He urges everyone to recognize that "food is power and can be used to prove to the world what a free people can do."

Many here in Washington are coming to recognize industry's growing role in making possible this "number one success story," and suggest that greater efforts might well be exerted to make the general public aware of it, too.

While urging industry to do more agricultural research, Dr. Shaw is asking Congress for an additional \$6,195,800 for USDA research in fiscal 1962; an extra \$1,075,000 for disease and pest control programs; and another \$2 million for payments to State Experiment Stations.

Part of these funds are to go into staffing and operating three new insect research laboratories; boll weevil research at State College, Miss.; and research on insects of corn and small grains at Tifton, Ga., and Brookings, S. D. At Mississippi State College, ARS entomologists will team up with other scientists in an all-out attack

against the boll weevil, which, Dr. Shaw says, has cost cotton farmers \$200 million a year for the past 50 years.

Pesticides Coordination Act

Conservation forces are expected to come out strong for passage of the "Chemical Pesticides Coordination Act" which died in the last session of Congress for lack of action. The bill has been re-introduced as H. R. 4668 and proposes to make Federal authorities consult with the U.S. Fish and Wildlife Service, U. S. Public Health Service, and state fish and wildlife agencies before conducting any mass control or eradication programs. In the last session, agricultural officials argued that this measure would hamstring many necessary pest control operations, and that, in any case, Federal authorities do consult with other affected agencies in planning their programs.

A new development, and possibly an encouraging one, is a resolution by the National Wildlife Federation urging increased research on short-lived chemicals which could be used in mass control programs "without damage to other values, including wildlife, acquatic life and public water supplies." While not going as far as recognizing that present practices cause no substantial hazard to fish and wildlife, the resolution does appear to be a step forward toward a reasonable solution.

Avoiding Residues

Moves are being made here in Washington to make the regulation of the use of farm chemicals more reasonable as well as more effective. Many of the changes are small in themselves, but they add up to major advances which should aid manufacturers as well as farmers.

One significant forward step has been the publication by USDA of a listing of all registered agricultural pesticide uses. This listing, prepared by Justus Ward, head of USDA's Pesticide Regulation Branch, gives Extension specialists and others a full listing of pesticides uses, dosages, and time limits on application in order to avoid contamination of foods. This information gets to farmers via state recommendations and via county agents.

Meantime, the Federal Food and Drug Administration has been moving ahead to avoid any repetition of the "cranberry incident" of last year. Assistant Food and Drug Commissioner Winton B. Rankin says that FDA has been making special efforts to encourage food shippers to label shipments so that they can be pinpointed at spots between the shipping point and market.

He says it was failure to locate two such shipments of cranberries, known to bear over-the-limit residues of a chemical, which caused the nation-wide publicity and the "incident." Normally, any foods which are found to bear nonpermitted residues are seized and held off the market without such fanfare.

While this move will help to locate lots of foods which bear nonpermitted residues, the principal method of avoiding such incidents is up to farmers. If they apply chemicals on the crops, in the dosages, and at the times recommended, they can be sure their crops are safe and seizures can be avoided.

Rankin says that FDA now has some 450 inspectors, and over half of them are working on foods. Their work is aided, however, by the work of state control agencies and USDA's Extension Service. All, he says, are seeking to maintain an abundance of wholesome foods for America's growing population.

In another move helpful in stabilizing the regulation of the use of pesticides, FDA now is tying the tolerance level to a specific method of residue analysis. If a tolerance as determined by one method is found to be safe, uses of the pesticide are not likely to need revision if a more sensitive method of analysis is found.

Sulphur Information Center

The one-year old Sulphur Institute is moving ahead with plans to develop a center for technical and scientific information relating to the agricultural use of sulphur in all its forms.

. By the end of this year, or early next, you can expect the Sulphur Institute's center for technical and scientific information on the uses of sulphur in agriculture to be well underway.

The Institute is set up on an international basis to direct research on the uses of sulphur as a plant nutrient, and its use in the construction and road building industries.

In addition, the Institute is continuing its support of the Food and Agriculture Organization's program to increase fertilizer consumption in underdeveloped areas of the world. This program is part of FAO's "Freedom From Hunger" campaign, which has wide-spread support from the fertilizer industry.

Increased Interest

The pesticide industry is showing increased interest in FAO's "Freedom From Hunger" campaign. The National Agricultural Chemicals Association has been represented at conferences at FAO headquarters in Rome on the role pesticides can play in the program designed to raise the level of food supplies in emerging countries around the world.

Record Showings

The National Plant Food Institute deserves a pat on the back for the fine showing of its educational motion pictures. These films not only inform farmers and home owners on how to use fertilizer more efficiently, but they inform non-farmers of the value of fertilizer to a healthy, productive agricultural economy.

During the school year from September 1959 to September 1960, NPFI reports that its films ran up a record of 3,705 showings and a total audience of 797,807. Most popular of their films was "Making The Most Of A Miracle" which deals with basic plant nutrition.

Velsicol Garden Film

Velsicol Chemical Corp.. Chicago, is making available to lawn and garden supply dealers a color movie entitled "Lawn and Garden Insect Control." The film is intended to be used for group showings by dealers who wish to educate their customers to recognize lawn and garden insects, the damage they cause, and how they can be controlled.

The film, produced by Iowa State University in cooperation with velsicol, features close-up shots of a wide variety of insects as well as the damage caused by them. Prints of the 16mm sound film may be obtained for specific show dates on a free loan basis from Velsicol at 330 East Grand Ave., Chicago 11.

Patent Granted To Hester

Jackson B. Hester, Jackson B. Hester Agricultural Research Laboratories, Elkton, Md., has been granted U. S. Patent No. 2,976,138 "Trace Element Solutions for Correcting Soil Deficiencies." The invention involves an ammoniacal solution of trace elements, which includes complex ammonium salts of the trace elements, making them readily available to plants. Dr. Hester has assigned the patent to the Suburban Propane Gas Corp., Whippany, N. J.

SYMBOLS OF PLANT LIFE



medieval times, the "black art" of alchemy was condemned by superstitious authorities hardly less ignorant of chemistry than the masses. To avoid persecution . . . and possible execution . . . for witchcraft, alchemists invented secret symbols for

use in their experiments with potash and other basic elements.

TODAY, EXPERIMENTS ARE STILL BEING MADE WITH POTASH . . . BUT NOW NO SECRETS SURROUND ITS IMPORTANCE IN AGRICULTURE.

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36 rows high...and no slippage problem (EXPANDA-KRAFT makes it possible)

Better stacking and extra-toughness are two reasons why Winter Garden Citrus Products Cooperative of Florida has switched from burlap sacks to extensible paper bags of Expanda-Kraft. They stack more evenly than burlap—in the warehouse or on a truck.

Cleanliness is another reason. Bags of Expanda-Kraft do not create as much dust and dirt as burlap bags. In addition, they print better. They're easier to read. And finally, bugs and rodents are less troublesome with bags of Expanda-Kraft.

Keep this in mind. Expanda-Kraft is extra tough because it has two-way stretch. In fact, ExpandaKraft has the *highest cross-direction stretch* of the leading extensible papers now on the market. It can absorb rough impacts from any direction.

H&W does not make bags. But we'll be glad to put you in touch with reliable bag manufacturers. For information and samples, write Hollingsworth & Whitney, 230 Park Avenue, New York 17, N. Y., or 111 West Washington Street, Chicago 2, Illinois.

Hollingsworth & Whitney Division SCOTT PAPER COMPANY



Equipment, Supplies, Bulletins

Atlanta Batch Mixers

Atlanta Utility Works, East Point, Ga., is offering batch mixers that feature an improved discharge chute and discharge mechanism for faster, more complete discharge with less build-up and sticking. The mixers are available in sizes ranging from ½ ton to 2 tons. In addition to the improved discharge chute, the mixer flights have been revised to better handle wet, sticky mixtures and eliminate build-up and sticking in the drum. Complete information on the batch mixers is available from the company.

Webster Fertilizer Bucket

Webster Manufacturing Co., Tiffin, Ohio, has prepared a bulletin to describe its malleable iron bucket for handling fertilizer and similar materials. In test applications, the new design is said to have lasted up to three times as long as conventionally designed buckets. In addition, strength and wearing qualities are increased through the use of extra metal thickness in strategic areas although the bucket weighs less than the ordinary reinforced-back bucket.

High-Capacity Conveying

Finco, Inc., Aurora, Ill., is offering expandable conveyors that are available in sizes ranging from 6 feet to 65 feet in length, and from 6 inches to 24 inches in width. Sections can be added or removed to accommodate changing plant needs.

Because Finco conveyor-belts form natural troughs, approxi-

mately 2 inches deep, they can be used for high-capacity conveying, according to the company. A bulletin is available to describe the equipment.

Quick-Opening Closure



Bemis Bro. Bag Co., St. Louis, now is offering a quick-opening closure for sewn open-mouth and sewn valve multiwall paper shipping bags. The opening is available throughout the United States, except in certain eastern portions of the country and the West Coast where the new feature will be available within a few months.

The opening, called the Bemi-Strip, features a tab, three inches in length and three-eighths inch in width, that is placed on the factory-closed end of the bag, usually at the top. The tab serves as a point of contact for the thumb and first finger to initiate the opening of the package. A pull snaps the tab loose from the bag seam and frees the sewing thread. The bag can be opened partially, to form a filling spout, or completely, as desired.

Processing Vessel Liners

Comar Plastics, Edison, N. J., is offering custom-fabricated tank liners made of heavy vinyl sheeting for use in restoring old chemical storage and processing vessels. The liners, made from Krene vinyl sheeting, are resistant to a wide variety of acid, alkaline, and salt solutions, and some hydrocarbon systems. Krene vinyl sheeting is produced by Union Carbide Plastics Co., New York.

New Weedone Formulation

Amchem Products, Inc., Ambler, Pa., is offering a new Weedone Crabgrass Killer Liquid formulation that also will control Dallis grass and foxtail. The new formulation is said to provide increased safety for lawn grasses.

Self-Dumping Hoppers

Roura Iron Works, Inc., Detroit, is offering self-dumping hoppers that can be used to handle bulk shipments by plants regularly accustomed to handling only bagged products. The hoppers are of one cubic yard capacity and hold approximately 2,400 pounds of material. They can be moved by fork trucks and a release handle on the rear of the hopper permits the fork truck operator to dump the contents of the hopper at the unloading point. Complete details of the unit are available from the company at 1401 Woodland Ave., Detroit 11.

Diamond Soil Sterilant

Vacate, a soil sterilant for control of weeds and grasses, is being offered by Diamond Alkali Co., Cleveland, Ohio. The product not only kills existing weeds and grasses, but it suppresses regrowth of vegetation for a year or more. A non-selective heribicide, Vacate is intended for use in areas where grasses and weeds might create a fire hazard, such as rights-of-way, oil and gas storage yards, fence lines, and open storage sites.

Rodent Control Folder

The Wisconsin Alumni Research Foundation, Madison, Wisc., has distributed 20,000 sets of rodent control literature to county agricultural agents, vocational agricultural instructors, and state supervisors and health officers throughout the United States. Believed to be the largest and most inclusive mailing ever made on the subject of rat and mouse control, the literature is intended to stimulate increased interest in rodent control programs on the part of agricultural and health leaders.

Soil Insect Brochure

Velsicol Chemical Corp., Chicago, has prepared a brochure on soil insect control that lists the common soil insects that damage corn and tells how they can be controlled with Heptachlor.

Edco Water Drill

Eynon-Dakin Co., Detroit, is offering the Edco Water Drill that, when attached to a garden hose, drills itself into soil at a rate of up to four feet per minute. It may be used to saturate roots of trees or shrubs, to make holes into which fertilizer can be placed, and to drill small diameter post holes. Constructed of aluminum tubing, the water drill is 48-inches in length.

Portable Plastic Greenhouse

Waco-Porter Corp., Minneapolis, Minn., is offering a portable plastic greenhouse that features a double-wall construction principle that is said to provide numerous advantages to growers. The greenhouse consists of a translucent polyethylene sleeve pulled over a curved, tubular galvanized steel frame.

Standard units now available are 5½ feet wide and either 11 or 22 feet in span. The 11-foot unit stands 3½ feet high at midpoint and covers 60 square feet of ground. The 22-foot unit stands 9 feet high and covers 121 square feet of ground.

Baughman Liquid Spreader

Complete information on the Baughman Rapid Spread Liquid Fertilizer Spreader is available in Bulletin A-461 offered by Baughman Mfg. Co., Jerseyville, Ill. The new spreader operates on compressed air and discharge is in the form of solid droplets, rather than mist spray.

The Rapid Spread is designed for mounting on a regular flat bed truck or wagon. Standard units weigh approximately 1,380 pounds and hold 1,000 gallons of liquid.

Hi-Speed Richardson Bagger

Richardson Scale Co., Clifton, N. J., is offering a scale that features a new device that speeds up beam response and leads to faster feed cutoff. The scale, called SPEEDAC, E-50, weighs up to 24 50-pound bags of free-flowing materials per minute.

Diamond Water Herbicide

Diamond Alkali Co., Cleveland, is introducing a granular herbicide for the destruction of water weeds. Known as Crop Rider 20% Aqua Granular, the product is formulated to rid ponds, lakes, and ditches of plants. It has been used in lakes with results that are reported to have been excellent and without harmful effect on fish.

Application can be made from a raft or boat by attaching a fertilizer-type spreader to the end of the boat. Other methods recommended by Diamond are whirlplate type of seeder, broadcasting by hand, or spreading by helicopter.



Fertilizers and Fertilizer Raw Materials

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Volume 6

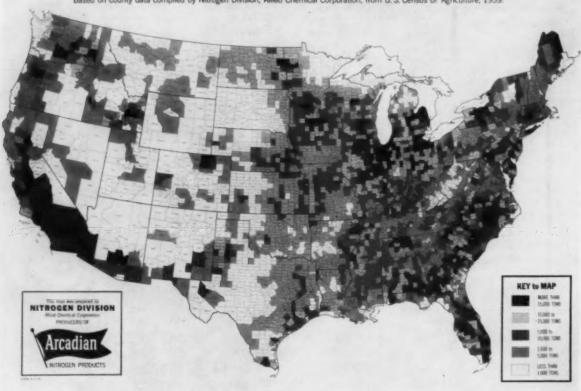
Nitrogen Division, Allied Chemical Corporation

Number 6

Get This Map FREE!

USE OF COMMERCIAL FERTILIZERS BY FARMERS

Based on county data compiled by Nitrogen Division, Allied Chemical Corporation, from U.S. Census of Agriculture, 1959.



This is a miniature reproduction of a big map, 28 inches long and 21 inches deep, lithographed in five colors, which you can obtain without charge from the ARCADIAN News. Just use the coupon on the next page. Based on 1959 U. S. Census of Agriculture figures, this

map shows the relative importance of each county in 48 states as a market for commercial fertilizers. On the map, counties that use more than 15,000 tons of commercial fertilizers are shown in red; 10,000 to 15,000 tons, in (continued on next page)

Arcadian News for Fertilizer Manufacturers from Nitrogen Division, Allied Chemical

(continued from preceding page)

yellow; 5,000 to 10,000 tons, in green; 1,000 to 5,000 tons, in blue; less than 1,000 tons, in white. This map is ideal for quick reference. It shows you, at a glance, the exact location of the best fertilizer markets. You will use it many times in many ways. Only a limited number of these maps are available. To obtain your free copy, we suggest that you fill out and mail the coupon below today!

State Tables Also Available

In addition to the map, ARCADIAN News has also prepared an individual state table for each of 48 states, similar to those shown at right for Illinois and Indiana. Based on census figures, these tables give the following data for each state:

- * Total farms in state.
- Farms using fertilizer.
- * Total tons of fertilizer.

Each table also gives the following data for each major crop grown in the particular state:

- * Acres fertilized.
- Tons dry material used.
- * Tons liquid material used.

You can obtain individual state tables containing all of this information for the states in which you are interested, simply by mailing the coupon below. There will be a big demand for these tables and supplies are limited. We therefore suggest that you mail your coupon today. ARCADIAN News has compiled and reproduced this information as a service to the fertilizer industry and there is no charge for this service.

ILLINOIS

TOTAL FARMS IN STATE 154,640 FARMS USING FERTILIZER 107,632 TOTAL TONS OF FERTILIZER . . . 1,219,329

CROP	Acres Fertilized	Tons Dry Material	Tons Liquid Materia
CORN	6,483,003	677,542	143,481
WHEAT	1,255,233	147,045	15,171
SOYBEANS	489,998	55,984	1,754
HAY & CROPLAND PASTURE	318,789	76,013	2,156
All Other Crops Instituting Nan-Crophend Pasture	532,075	97,262	2,921
TOTAL ALL CROPS	9,079,098	1,053,846	165,483

INDIANA

TOTAL FARMS IN STATE 128,160
FARMS USING FERTILIZER 102,416
TOTAL TONS OF FERTILIZER . . . 1,005,600

CROP	Acres Fertilized	Tons Dry Material	Tons Liquid Material
CORM	4,839,631	581,559	58,415
WHEAT	1,163,838	140,987	6,182
SOYBEANS	823,685	63,284	1,437
HAY & CROPLAND PASTURE	302,942	40,451	1,284
All Other Crops Including Nan-Cropland Parture	890,769	108,103	3,898
TOTAL ALL CROPS	8,020,865	934,384	71,216

CLIP and MAIL this COUPON to get your map and tables promptly!

ARCADIAN News, Nitrogen Division, Allied Chemical Corporation, 40 Rector St., New York 6, N.Y.

Without charge, send me the big 5-color map showing use of fertilizers in every county of 48 states. Also send me fertilizer data tables for the states I have checked below.

Alabama	Georgia	Maine	Nebraska	Ohio	Texas
Arizona	Idaho	Maryland	Nevada	Oklahoma	Utah
Arkansas	Illinois	Massachusetts	New Hampshire	Oregon	Vermont
California	Indiana	Michigan	New Jersey	Pennsylvania	Virginia
Colorado	lowa	Minnesota	New Mexico	Rhode Island	Washington
Connecticut	Kansas	Mississippi	New York	South Carolina	Wisconsin
Delaware	Kentucky	Missouri	North Carolina	South Dakota	Wyoming
Florida	Louisiana	Montana	North Dakota	Tennessee	West Virginia

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Precautions for Handling Solutions in Hot Weather

Fertilizer plant operators who ignore the effect of heat on the physical properties of ammoniating solutions are liable to be in "hot water" in hot weather. The most efficient operators keep one eye on vapor pressure curves and the other eye on the thermometer, so they can handle nitrogen solutions properly when the temperature goes up.

In the summer, the vapor pressure of solutions is a matter of serious concern from the moment of arrival of the tank car at the plant until the ammonia in the solutions has been neutralized by superphosphate or acid in the mixer.

Two Pressures

Two pressures are involved in hot weather handling—the vapor pressure of the solution and the air pressure that is required to move the solution through the equipment. Both of these pressures tend to increase in warm weather, and all equipment must be able to withstand the extra pressure. Gauges and safety devices must be in good working condition. The hose from the tank car should be securely connected to ample fittings with heavy metal clamps having four large bolts each. (Make certain that all pressure is released before disconnecting hose. This is particularly important when quick-acting couplings are used.)

Importance of Air Pressure

Most vapor-pressure, warm-weather problems can be overcome by maintaining enough air pressure to keep the ammonia in solution at all points in the system where gas formation can cause trouble. Always keep the air pressure higher than the vapor pressure.

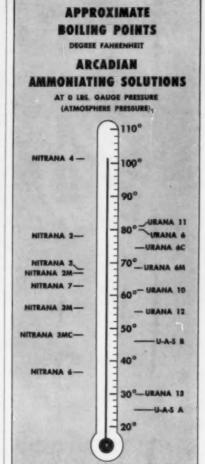
In the Tank Car

Insufficient air pressure in the tank car can permit the rush of enough ammonia gas through the hose to make the operator believe that the car is empty. If there is much back-pressure from hot storage tanks, measuring tanks or pipelines, it may be impossible to move any nitrogen solution from the car until the back-pressure is relieved or the pressure in the car is built up with air. Incidentally, pressure cannot be gauged accurately at any point while a fluid is moving rapidly past that point in the system.

At the Pump

At the suction side of the pump, where the relative vacuum has the same power as increased temperature to release ammonia gas, even a small amount of gas will vapor-lock almost any pump. Leakage of air into the suction line will also vapor-lock pumps. Centrifugal pumps can often be made to function by throttling down the discharge volume from the pump enough to reduce the pull on the suction side. But this procedure is of little help in positive-displacement pumps, such as gear and piston pumps, since they deliver about equal volumes of liquid at all discharge pressures. Furthermore, these pumps may be damaged by excessive pressures.

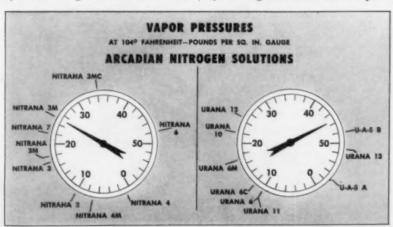
Trouble at the pump is sometimes caused by hot suction lines. These lines may be cooled with water, or cooled by allowing some ammonia to vaporize



through the stopped or slowly turning pump so as to refrigerate the metal. White or aluminum paint on piping and tanks reflects the sun's rays to reduce heating.

At the Volume Meter

In volumetric meters and measuring tanks, the solution will weigh less per gallon if it develops many bubbles due to low pressure. The bubbles can be so microscopic that they escape attention. Sometimes the bubbles are moving actively enough to make it impossible to read the level of the solution in gauge glasses or glass rotameter tubes. Adequate air pressure will correct this condition. Even when ammoniating solutions are in 100 per cent liquid state while being measured volumetrically, they average one per cent lighter weight per gallon for each 25 degrees F. increase above the standard measuring temperature of 60 degrees F. The exact data on temperature-weight relationships for all ARCADIAN Nitrogen Solutions are available on request from Nitrogen Division, Allied Chemical Cor-



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(continued on following page)

(continued from preceding page)

poration. The specific gravity or weight of anhydrous ammonia decreases still faster with an increase in temperature about one per cent for each six degrees F. increase in temperature.

In Tanks and Pipes

All these liquids generate high pressures when they are trapped within tanks 100 per cent full of liquid, or in pipe lines between two closed valves. Ample vapor space must be allowed in all tanks. This takes a considerable amount of head space for anhydrous ammonia.

In the Mixer

In the distributor pipe inside the fertilizer mixer, the heat may be so great that special techniques must be invoked for coping with large amounts of ammonia gas. For specific help on this problem, see your Nitrogen Division, Allied Chemical, technical service representative.

Hot weather troubles with any ammoniating solution may start when the temperature of the solution reaches the boiling point at atmospheric pressure. This is a lower temperature than you would normally expect trouble, but it usually develops when you are using a pump located beneath the supply tank. If enough air pressure is added, it will prevent volatilization of ammonia gas at the critical points. As shown in the table, the boiling points of some ARCADIAN Nitrogen Solutions at atmospheric pressure, and their vapor pressures at 90 degrees F. and at 104 degrees F., show a need for alertness in handling.

Vapor Pressure Changes

At increased temperature, an ammoniating solution takes on the vapor pressure properties of a more volatile solution. For instance, at 90 degrees F., NITRANA 2 develops a vapor pressure of only 4 pounds, so that handling is easy. But at 104 degrees F., its vapor pressure of 10 pounds is about the same as that for NITRANA 2M, NITRANA 3 and URANA 6M at 90 degrees F. Warm weather always requires extra attention in moving solutions.

For example, at 100 degrees F. atmospheric temperature, the contents of an 8,000-gallon uninsulated tank car loaded with NITRANA 2 develops the following temperature and pressure:

Maximum daily high pressure: 29.3 pounds at gauge

Average daily high pressure: 13 pounds Liquid temperature at the top level in the tank car: 108 degrees F.

Liquid temperature in the middle of the tank car: 86 degrees F.

Liquid temperature at the bottom of the tank car: 81 degrees F.

Vapor temperature at the top of the solution: 131 degrees F.

Judging from the published pressuretemperature relationship, you might expect that 100 degrees F. temperature would build up only 8 pounds of pressure. The additional 5 pounds at average high pressure, and 21 pounds at maximum pressure, could cause trouble for an unwary operator.

Other spots where it may be hotter

Other spots where it may be hotter than you expect are in pipelines exposed to the sun, near metal siding in the sun, near dryers, in or near the hot mixer, or almost anywhere in a warm building.

Changing Solutions

In summer, many fertilizer producers change to a nitrogen solution which has a lower vapor pressure to avoid problems. You have a wide choice in the big line of ARCADIAN Nitrogen Solutions to meet the most exacting requirements. However, if you choose to use your winter solution, you may continue using it by making a few simple changes in equipment and operation. For instance, you can insulate your pipelines and improve the ease of operation both in hot weather and in cold weather.

You can get help in choosing the right ARCADIAN Nitrogen Solution by asking your Nitrogen Division technical service representative. Summer or winter, you can realize maximum benefits in fertilizer manufacture by picking the right solution for every situation. For technical advice and assistance, contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

GREEN FIELDS CAN BE SALES MAKERS

Green fields speak as loud as big yields to many farmers. When the corn leaves lap in the row, the oats are shoulder-high, and the pasture is knee-high to cows, any farmer loves to show off his crops. That's a good time to go and see him, if he uses your fertilizer. It's also a good time to show his crops to other farmers.

One farmer applied a double dose of fertilizer to his corn by mistake. He made a big profit on the extra tonnage of silage produced by the extra fertilizer. But he didn't tell his neighbors about yields and profits. He told them how tall and green his corn grew during a dry season. He knew he made money from fertilizer. This was dramatized to him by the lush, green crop right before his eyes all summer.

It will pay you to take advantage of a farmer's pride in a good crop grown with your fertilizer. He can be an excellent salesman and demonstrator for you. Farm calls, when crops are green and growing, can produce plenty of success stories. The best way to tell these success stories is to take other farmers to see them. This enthusiasm sells fertilizer.

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You are served by the leading producer of the most complete line of nitrogen products on the market. You have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You get formulation assistance and manufacturing advice from the best-qualified technical service staff in the industry. You benefit from millions of tons of nitrogen experience and the enterprising research that originated nitrogen solutions. You get many important bonus values when you make ARCADIAN Nitrogen the N in your N-P-K.

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NEWS ABOUT THE



Hovey Fills New Position



C. L. Hovey

D. H. Marsden

Chas. L. Hovey (left), previously head of agricultural chemicals research at Eastern States Farmers' Exchange, West Springfield, Mass., has been advanced to manager of one of eight newly-created field areas. In this new position Mr. Hovey directs all Eastern States activities within Connecticut and western Massachusetts. His headquarters are in West Springfield.

David H. Marsden, previously asso-

David H. Marsden, previously associated with Mr. Hovey, has been promoted to head of the Eastern States agricultural chemicals research department. Prior to joining Eastern States in 1954, he had been plant pathologist at the Shade Tree Laboratories, University of Massachusetts.

Round Table Lists Theme

Materials handling will be the theme of the Fertilizer Industry Round Table to be held November 8 to 10 at the Mayflower Hotel in Washington, D. C. The program for the meeting is being developed around a group of semi-informal papers dealing with the theme and two question and answer sessions.

The materials handling theme has been divided, for purposes of the Round Table, into four categories. They are unloading, storage, shipping, and in-plant handling. Round Table members have been invited to submit questions for discussion.

Pratt Joins IFD Corp.

Christopher J. Pratt has been appointed vice president in charge of operations by International Fertilizer Development Corp., an affiliate of International Ore & Fertilizer Corp., New York. He had been with Ebasco Services, New York, and Dorr-Oliver, Inc., Stamford, Conn. Mr. Pratt is a coauthor with Dr. Vincent Sauchelli of "Chemistry and Technology of Fertilizers."

Ribicoff To Address NAC

Abraham A. Ribicoff, Secretary of Health, Education, and Welfare, will be the featured speaker at the annual banquet of the National Agricultural Chemicals Association during the group's 28th annual meeting at the Homestead in Hot Springs, Va., Oct. 29 through November 1.

Analytical Workshop

A workshop on new methods for determining phosphorus in fertilizers will be held July 6 to 8 at Purdue University, Lafayette, Indiana. The workshop is being cosponsored by the Association of American Fertilizer Control Officials, the Association of Official Agricultural Chemists, and the National Plant Food Institute.

In addition to group laboratory work, the workshop will feature discussions of principles and details concerning quinolinium method, gravimetric procedure, volumetric procedure, photometric method of analysis.

Pesticide Hazards Report

The California Department of Public Health has prepared a report concerning occupational diseases in California attributed to pesticides. The report states that there has been a steady increase in the number of disease reports despite a decrease in the agricultural labor force.

William Caspari Retires





W. Caspari

W. M. Rohrer

William Caspari Jr., general sales manager, agricultural chemicals, of W. R. Grace & Co., Davison Chemical Div., Baltimore, Md., retired May 31 after 44 years of service with Davison, the only company for which he ever had worked. He will continue with the Company in a consulting capacity.

In 1915 he joined the Davison Chemical Co., working in the chemistry laboratory. In 1919 Davison sent him to Cuba in charge of the company's railroad and pier loading facilities.

Mr. Caspari in 1929 was returned to Baltimore in wholesale sales for Davison and was instrumental in the organization of Davison's export department and has traveled extensively in Latin America, Canada and Europe, as well as the United States, for the department.

William M. Rohrer has been named to succeed Mr. Caspari as general sales manager, agricultural chemicals. Mr. Rohrer, who has been with Grace for 14 years, had been assistant general sales manager.

Cyanamid Plans Increase

The American Cyanamid Co., New York, plans to increase production capacity of phosphate fertilizer at its Brewster, Fla., plant. The expansion will provide facilities for producing 200,00 tons per year of granular triple superphosphate fertilizer.

In addition, a new coarse triple superphosphate and an increased supply of run-of-pile material will be available. The new production capacity is part of Cyanamid's long-term program of expansion.

Production utilizing the new installations is expected to begin early next year.

Fertilizer Outlook For '61 Dim Despite Early Optimism

DESPITE earlier optimistic predictions, late reports indicate that the fertilizer industry currently is feeling the ill effects of excessive rains, and the revised farm program. The outlook appears to be that, unless there is some improvement in weather conditions in another few weeks, the year's tonnage may not reach that of last season.

Heavy fertilizer shipments during March supported the early feeling of optimism but there was a noticeable drop in tonnage in April, particularly in the corn belt, where farmers, spurred on by inclement weather, have been retiring more feed grain acreage under the Emergency Feed Grain Program.

Corn takes about the highest percentage of fertilizer for any single crop, but a general drop in consumption for other crops is feared because of excessive moisture, particularly in the midwest, south and northeastern states.

Figures released during May revealed that more than 12 million acres have been diverted from corn and grain sorghum plantings under the 1961 farm program. This acreage is located on 55,623 farms that averaged nearly 30 million acres of corn and grain sorghum plantings during 1959-60.

Additive Reactivates DDT

An additive that reactivates DDT was discovered by Dr. Moshe Neeman in Israel and has been developed by the Wisconsin Alumni Research Foundation. The additive is N,N-di-N-butyl-p-chlorobenzenesulfonamide. WARF finds that after 18 generations, flies still are susceptible to conventional dosages of additive-DDT combinations. The additive prevents insects from turning DDT into noninsecticidal DDE by use of an enzyme, dehydrochlorinase.

A second enzyme that inactivates DDT in insects has been found at the University of California, Berkeley. The enzyme converts DDT to a harmless Kelthanelike product, called metabolite No. 4, through a process of oxidation.

Potash Deliveries Higher

Deliveries of potash for agricultural purposes in the United States, Canada, Cuba, and Puerto Rico by the eight principal American producers and also the importers totaled 1,115,911 tons of salts containing an equivalent of 647,764 tons of K₂O during the first three months of 1961.

Excluding imports, this was an increase of 10 per cent in salts and K₂O over the same period in 1960. Continental United States took 607,799 tons K₂O, Canada, 25,236 tons, Cuba, no tons, Puerto Rico, 10,108 tons, and Hawaii, 4,621 tons K₂O. Exports to other countries were 97,915 tons K₂O, a decrease of 19 per cent.



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Beaumont, Texas is the shipping point for practically all the TGS tonnage of molten sulphur sent to the eastern half of the United States. BUT instead of waiting for deliveries measured in days TGS customers can rely upon these four regional terminals and get their supplies in much faster time.

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CARTERET NE

Diamond Herbicide Comics

Diamond Alkali Co., Cleveland, Ohio, has prepared a 16-page, full color cartoon booklet to dramatize Diamond's three brand name herbicides, Crop Rider, Fence Rider, and Line Rider.

The booklet, designed primarily for children between 8 and 12 years of age, uses a western approach to tell the story of herbicides. The plot is woven around three deputies (Crop Rider, Fence Rider, and Line Rider) who rid the town of Pleasantville of such desperadoes as the ragweed gang, the bramble brothers, and Wild Cherry Charlie.

Michigan State Field Day

The annual Crops-Soils Field Day at Michigan State University farms in East Lansing will be held June 29. Tractor-drawn trailers will take visitors to tour stops where research personnel will explain such activities as fertilizer placement experiments, chemical weed control and soil testing.

\$96 Million Lost To Borers

The European corn borer last year destroyed an estimated 102,-991,000 bushels of corn worth \$96,-085,000, according to figures released last month by the U. S. Department of Agriculture. The loss, a composite of state and USDA estimates, nearly equals Wisconsin's entire 1960 crop, and is about 2.6 per cent of the total U. S. crop. It was 52 per cent greater than in 1959, and is the fourth largest bushel loss in the past 10 years attributed to borers.

Swiss Pesticide Industry Is Well Established

OF the 16 firms in the Swiss pesticide industry, the two most prominent are Dr. R. Maag AG., Dielsdorf, and J. R. Geigy AG., Basel, followed by Sandoz AG., Basel, and Siegfried AG., Zofingen. Geigy had a very good year in 1960 with Simazine. Maag's best seller was Cuprosan, a fungicide used in vineyards against mildew.

Ciba, the largest Swiss chemical producer, several years ago purchased a small pesticide manufacturing company but it has not taken the lead in pesticide sales. The Shell Oil Co., Zurich, a relative newcomer, has launched an extensive advertising campaign to capture a share of the market, according to a report prepared by A. Lombardi of the American Consulate in Zurich.

The Swiss pesticide industry is financially strong and is well-equipped with modern research laboratories and testing stations. Switzerland, however, lacks natural resources and must import all pesticide raw materials. The U. S. is a major supplier of organic fungicides such as Captan, Glyodin, Karathane, Maneb, and Phal-

than. Benzene is supplied largely by the domestic market.

Swiss farmers spent \$5.6 million, estimated at about \$3.9 million at the manufacturers' level, for pesticide products in 1959; 3.5 per cent more than in 1958. In terms of quantity, however, consumption decreased from 5,890 to 5,460 metric tons, probably as a result of the trend toward use of newly-developed, specialized preparations in place of those formerly consumed.

Data on exports and imports of pesticides are not available, but it can be assumed that at least 50 per cent of total production is exported, principally in the form of active ingredients.

The outlook for the Swiss pesticide industry is a healthy one. Domestic producers are well established and, although there are no special government or private programs to increase consumption, demand is steady. Possibilities for increased U. S. exports to Switzerland principally are in technical pesticides and, to a lesser degree, in formulated materials. Domestic manufacturers supply the relatively small quantities of finished goods.

Expands Marketing Program

Spencer Chemical Co., Kansas City, Mo., has expanded its program to market Spencer products on a world-wide basis and to seek foreign investment opportunities. Spencer Chemical International has taken complete charge of the parent company's overseas operations.

Stabilized Methyl Parathion

Victor Chemical Works, division of Stauffer Chemical Co., Chicago, is offering a new, stabilized form of methyl parathion. The product is being introduced on a national basis under the trade name Stabilized T-80 methyl parathion.

Duval Sees Normal Year

Earnings and revenues of Duval Sulphur & Potash Co., Houston, are not expected to reach the "abnormally high" levels of 1960, according to W. P. Morris, president of the company.

Export shipments of sulphur this year will about equal exports in 1960, Mr. Morris said, while domestic shipments will drop somewhat because of a "highly competitive" sales situation. He said that the company expects potash and molybdenum sales to be "generally good," but revenues from copper are expected to drop.

The company's second potash ore body at Carlsbad, N. M., currently is starting production. The facility is located 13 miles from Duval's existing plant. Mr. Morris said that it is too early to tell whether the potash industry will follow the American Potash & Chemical Corp. in boosting potash prices.

Foreign Pest Found

A major European plant pest, Melolontha melolontha, had been found on airplanes arriving from Paris at airports in the United States last month. The reddish-brown beetle belongs to the same family as the Japanese beetle and the European chafer.

INTEROFFICE CORRESPONDENCE

TO: all department heads

FROM: L. W. Gopp, vice president

We've just closed the books on another fine fiscal year. This last twelve-month period has been one of our most successful to date and we've been unusually fortunate in signing additional new contracts.

More than ever I feel that the continued growth of our business reflects confidence in our people and in our products and services by an imposing list of customers. I feel, also, it is our individual responsibility -- at every level of the corporation -- to show, in an active way, our appreciation for this business. I encourage you to continue to look for new and improved ways to extend still further the IMC concept of total service.

Len Gopp

Heads Michigan Sales

Fred Dolton has been named manager of national account sales for the

Michigan line of bulk handling machinery by the Construction Machinery Division of Clark Equipment Co., Buchanan, Michigan. His headquarters are in New York. Prior to this assignment, Mr. Dolton had



been national account sales representative for the Construction Machinery

Olin To Move To N. Y.

Olin Mathieson Chemical Corp., plans to move the headquarters of its chemicals division from Baltimore to New York. Almost 700 persons are employed in the division headquarters, which now occupies parts of nine floors of the Mathieson Building in Baltimore. The corporation's Baltimore manufacturing operations will not be affected.

The offices being transferred to New York generally are the same ones moved to Baltimore from New York in 1949. All six of Olin's other divisions already have headquarters in New York. The move will be made this summer.

Niagara Shifts Johnston

Dr. Titus Johnston has joined the field research staff of Niagara Chemical Division of Food Machinery and Chemical Corp. at Jackson, Miss. He had been in charge of Niagara's pathology laboratory at Middleport, N. Y.

Pyrethrum Future Bright

Pyrethrum sales, which should hit \$7 million this year, could more than double that total in 1965, reaching nearly \$15 million, according to a report contained in the April 24 issue of Oil, Paint and Drug Reporter. Five general factors are believed to be involved in the resurgence of pyrethrum, which has been fairly steady in sales until recently.

Pyrethrum is relatively harmless to humans and other warmblooded animals; it is readily available; insects do not develop resistance to it; it is ideal for use by the increasing number of home gardeners; and the insecticide business as a whole has grown.

Pyrethrum's high cost, however, (\$55 per pound) is regarded as its key drawback for large-scale farm use. Volume users also are interested in residual effect, for which pyrethrum is not noted.

Considerably more than 90 per cent of the pyrethrum in U. S. insecticides comes from Kenya, with small amounts coming from Tanganyika and central Africa. The unstable conditions in Africa, however, have caused the pyrethrum industry to consider Ecuador, Brazil, and Peru as safety valves. There now is an extraction plant in Ecuador and one in Brazil. Within four or five years, it is expected that a plant will be built in Peru.

CACA To Meet Sept. 18 to 20

The 9th annual meeting and conference of the Canadian Agricultural Chemicals Association will be held at Mont Tremblant Lodge, Mont Tremblant, Quebec, September 18 to 20. A tentative list of speakers includes Dr. Rosemarie von Rumker of Chemagro Corp., who will discuss "Agricultural Chemicals, Research and Development Policy."

In addition, a senior economist in the field of agricultural trade will discuss the economics of future Canadian agricultural exports. A panel consisting of senior officers of some Eastern Provincial Departments of Agriculture also is planned and will cover such topics as extension, marketing, spray calendar, testing, and cooperation between industry and government.

Fertilizer Cost To Play Dominant Role In Future

HICHEVER segment of the chemical industry can put plant food "on the field" at the lowest cost "will dominate the future," M. D. Sanders, Agricultural Chemical Division, Swift & Co., Chicago, told a joint meeting of the American Institute of Chemical Engineers and the Chemical Engineering Division of the Chemical Institute of Canada, May 9, in Cleveland, Ohio.

Up to now, Mr. Sanders pointed out, the chemical plant food industry has consisted of two major divisions: the producers of the basic materials, ammonia, phosphates, and potash salts, and the mixers and granulators of complete NPK plant foods who buy all their raw materials from the basic producers. Recently, however, he added, "three additional routes from basic producers to the consumer have made their appearance."

He listed these routes as: 1. Some producers of phosphates also have become basic in nitrogen, resulting in the marketing of ammonium phosphates directly to consumers as well as to mixers and

granulators. 2. Some producers of nitrogen have gone the "nitrophosphate route" to complete NPK plant foods, and 3. Innumerable small, highly localized operations now are formulating liquids from phosphoric acid, ammonia, and soluble salts, or are dry mixing granulated and sized nitrogen phosphate and potash materials to grade or to prescription, often coupled with an application service.

"Which of the four methods of serving the consumer will dominate the future, in the last analysis, depends on the final cost of the plant food as applied in the furrow or on the field," he said. "Lower cost per ton of plant food in large, integrated plants may be counterbalanced by higher average freight rates to the consuming areas," he added.

"We, therefore," Mr. Sanders concluded, "may see one route from primary producer to consumer dominate in one area, and lag behind in another, depending on the logistics of phosphate rock, sulfur, natural gas, and potash salts."

To Expand Sulphur Research

The one-year-old Sulphur Institute will put its research and educational program, dealing with new and expanded uses for sulphur in all its forms in industry and agriculture, into full operation during 1961-62.

Although some research was begun during the current year, the 1961-62 budget for the institute provides for a variety of projects to be conducted by public and private research organizations in many parts of the world. With regard to agriculture, the studies will deal primarily with the use of sulphur as a plant nutrient. A number of projects are slated to assess the sulphur needs of soils in various areas of the world, including Europe, the United States, South America, Australia, and India. Other investigations will have as their aim the development of suitable soil and tissue tests to help predict sulphur needs of crops.

To Increase Capacity

United States Borax & Chemical Corp., Los Angeles, will begin construction this month to increase the capacity of certain production units at its Boron, California, installation. The project will raise production of both primary and specialized borax products.

Added Uses Cleared

Systox, Chemagro's systemic insecticide, has been registered in the U. S. for use on apricots, plums, and prunes to control aphids and mites, and on peppers to control aphids. In another move, the USDA cleared Sevin insecticide for use to control tobacco insects. Sevin is a product of Union Carbide.

To Operate Independently

Pacific Guano Co., Los Angeles, formerly controlled by a Hawaiian firm, will be operated as an independent agricultural chemical marketing organization, according to the company's new owner, Collier Carbon and Chemical Corp., Los Angeles. Pacific Guano markets a complete line of fertilizers, insecticides, and herbicides under the Gaviota and Gavicide brand names throughout California, Arizona, and Nevada. Wiliam H. Foster has been named president of the company.

Hurlimann Joins Geigy

Conrad G. Hurlimann has joined Geigy Chemical Corp. as vice president and director. He had been with Pfizer International, Inc.

Heads Deere Research

Dr. L. E. Craig has been named to the newly-created post of director of research and technical service for John Deere Chemical Co., Pryor, Oklahoma. He is in charge of all phases of research and technical services for both the Pryor and Tulsa plants of John Deere.

Dr. Craig has been with Deere & Co.'s chemical division, formerly Grand River Chemical Division since early 1954. He has been director of research since 1956.

Cyanamid Corn Herbicide

A new liquid herbicide for quackgrass control is being offered by American Cyanamid Co., New York, this season to corn growers in the northern United States. The product is being marketed under the tradename of "Cytrol" and has been tested extensively in the northeast and midwest. The major ingredient in Cytrol is amitrol.

Niagara Names Two

Nelson Darroch has been named technical assistant to the production manager at the head-quarters plant of Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y. He has been with Niagara since 1958 and had been chief chemist in quality control. Richard R. Heinze has been named to replace Mr. Darroch in that position.

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Long distance unloading

"I guess I've personally unloaded or supervised the unloading of better than 20,000 tank cars," said our materials handling supervisor, "but this was the first time I ever tried to unload one by long distance telephone.

"The plant manager who called was considerably embarrassed by the whole situation. He runs a small, efficient processing plant and is a good customer of ours for Tecmangam® (manganese sulfate), which he uses in his line of feed supplements. But the particular material he wanted to unload was not Tecmangam. In fact it did not

even originate at our plant. It came from another supplier whom he had been unable to reach by telephone.

"The situation was further complicated by the fact that not only was his unloading foreman off sick but this was the first time they had ever received this particular material. He said he did have a fresh-out-of-college chemical engineer handy, but this young man had assured him that tank car unloading had not been a prerequisite for his degree. I thought maybe I could work it out with him over the telephone anyway, so I asked if

I could talk to the new alumnus.

"Well, I outlined the entire procedure covering everything from foot valves to vent seals. Then he said, "Would you run that by again?"

"So I did, several times. And about fifteen dollars later we had the tank car hooked up and unloading. And I now know a proud young chemical engineer who could probably unload a tank car blindfolded—because he had to learn it the hard way."

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MH-30 Dispute Revived Following Special USDA Report

ONTROVERSY over the use of maleic hydrazide in the U. S. tobacco growing industry was revived last month by a special report from the U.S. Department of Agriculture which states that MH-30 changes the chemical and physical properties of the tobacco leaf, presenting a potential hazard to the cigarette leaf industry.

Dr. H. D. Tate, manager of agricultural chemical research and development, Naugatuck Chemical Division of U. S. Rubber Co., producer of MH-30, said however, that the report substantially supports the company's contention that "proper use of MH-30 will result in tobacco equally as good as handsuckered tobacco." He added that while the report says the chemical "may cause slight chemical and physical changes in a tobacco leaf, the major point emerging from the study is that MH-30 does not lower tobacco quality when it is

applied in accordance with the manufacturer's directions."

The study was undertaken by USDA at the direction of the House Committee on Agriculture. It was intended to settle a long-standing dispute between growers and the cigarette industry. The growers, finding MH-30 an effective laborsaver that reduces the cost of suckering tobacco and increases acreage vields, have maintained that it has no harmful effects on the tobacco and causes no reduction in filling capacity. The USDA report, however, states that "the loss in filling capacity alone threatens to reduce substantially the sale of U.S. leaf for economic reasons in such veryhigh-duty countries as Great Britain and Ireland, which together took 43 per cent of the U.S. fluecured leaf export in 1960.

"It would also reduce the competitiveness of U.S. leaf in other countries," the report goes on.

the Hopewell, Va., plant of Nitrogen Division, Allied Chemical Corp., New York. He had been chief engineer.

Midwestern Buys Badgerland

Midwestern Farm Fertilizers, Stevens Point, Wisconsin, has purchased the assets and trade style of Badgerland Liquid Fertilizers, Almond, Wisconsin.

Midwestern is the manufacturer of Kickapoo and Badger brand fertilizers. The new acquisition will be known as Kickapoo Liquid Fertilizers.

Bright Fertilizer Future

Fertilizer has one of the brightest futures of any segment of agriculture in the coming years, Dr. Floyd W. Smith, Kansas State University agronomist, told the recent convention of the Kansas Grain & Feed Dealers Association at Wichita.

Fertilizer sales in Kansas are expected to reach the 400,000-ton level by June 30, he said. "This represents a 10-fold increase over the fiscal year ending June 30, 1947, and a 100-fold increase compared with 20 years ago." Dr. Smith predicted that Kansas fertilizer sales will reach 500,000 tons per year between 1965 and 1970.

Potash Exploration Work

Northwest Co., Ltd., Calgary, Alberta, Canada, will carry out potash exploration work in Saskatchewan's Findlater and Regina Beach-Lumsden areas. The company is a wholly-owned subsidiary of Imperial Oil Ltd. Northwest has been issued exploration permits which cover approximately 199,986 acres.

Nitrogen Div. Advances Coli

Dr. G. John Coli has been named director of development at

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AGRICULTURAL CHEMICALS

Moves To Houston Office

Thomas M. Moran, formerly New York district manager in the Eastern Division of Signal Oil and Gas Co., Houston, Texas, has been appointed assistant manager of chemical sales in the Houston office. He has been with Signal Oil for more than six years.

Joseph A. Savoca, formerly a sales representative, has replaced Mr. Moran as New York district manager.

Monsanto 29-14-0 Fertilizer

Monsanto Chemical Co.'s Agricultural Chemicals Division is offering a new, high-analysis fertilizer that has been developed specifically to meet the soil needs of crop and pasture land in certain midwestern and southwestern regions. The fertilizer, trademarked Nutrium, is available in bulk and 80-pound bags and is marketed in prilled form. Its analysis is 29-14-0.

The product, made at Monsanto's Luling, La., plant, represents the company's initial move into the making of ammonium nitrate-phosphate materials.

PPG Advances Burrell

J. Earl Burrell has been appointed vice president of operations for the chemical division of Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Expand Dutch Facilities

The Foxboro Co., Foxboro, Mass., has completed a new instrument manufacturing and assembly building at the Foxboro (Nederland) N. V. plant in Soest, Holland. The new structure gives the plant a total area of nearly 40,000 square feet.

Meeting Dates Changed

The joint meetings of the Entomological Societies of Canada and Quebec will be held in Quebec October 16 to 18, instead of October 23 to 25 as had been previously announced.

Heads Chicago District

Burton L How Jr. has been appointed Chicago district sales manager for the Nitrogen Products



Nitrogen Products Division of W. R. Grace & Co., Memphis, Tenn. Mr. How, who joined W. R. Grace in 1953, had been anhydrous ammonia product manager in Memphis. Prior to this, he had been in

phis. Prior to this, he had been in the New York office for two years.

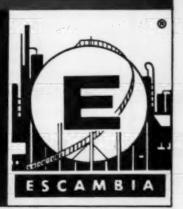
As Chicago district manager, Mr. How is responsible for a territory that includes North Dakota, South Dakota, Nebraska, Iowa, Minnesota, Wisconsin, Michigan, Ohio, and the northern half of Illinois and Indiana.

Pacific Branch Meets June 20

The Pacific Branch, Entomological Society of America, will meet at the Miramar Hotel in Santa Barbara, Calif., June 20 to 22. Among the topics to be discussed at the meeting are mite resistance, biological control of weeds, relation of spray deposits to plant surfaces and insect control, and the physical aspects of insecticides and their relation to application techniques.

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- AMMO-NITE[®] ammonium nitrate fertilizer
- BAY-SOL nitrogen solutions
- · ANHYDROUS AMMONIA



Technical Service Representatives Are Available To Help You At Any Time With Any Problem. 24 Hour Production For Extra Service.

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ESCAMBIA CHEMICAL CORPORATION

Pensacola, Florida

Exclusive Sales Agents

ASHCRAFT-WILKINSON COMPANY

Atlanta, Georgia

Escambia To Handle Sales

Escambia Chemical Corp., Pensacola, Fla., will assume the responsibility for the sales of its nitrogen products, effective July 1. Ashcraft-Wilkinson, who had been exclusive sales agents for Escambia in both the fertilizer and industrial markets since 1955, will continue to represent Escambia until July 1.

Escambia's nitrogen sales and technical service organization will

be headquartered in Atlanta, with sales representatives to be located throughout the southeast marketing area served by its Pace, Fla., plant.

Goldsmith Joins U. S. Borax

David W. Goldsmith has joined United States Borax & Chemical Corp., Boron, Calif., as senior process engineer. Mr. Goldsmith formerly was associated with American Potash & Chemical Corp.

Urges More Basic Research

American universities are being turned into "mere discovery factories" by the \$900 million a year the government spends for scientific research on the campus, Dr. Max Tishler told a dinner of the Industrial Research Institute at Boca Raton, Fla. Dr. Tishler, who is president of the Merck Sharp & Dohme Research Laboratories Division of Merck & Co., Inc., made his remarks in accepting the institute's 1961 Medal for leadership in industrial research.

He warned that unless university researchers devote more time to teaching future scientists, the "wells of discovery eventually will dry up." He recommended that government research and development programs directed at specific problems be separated from the campus. Instead, the universities should "be provided with funds for free, creative, and self-stimulated pursuit of new knowledge," he said.

Supervises SE Sales

Norman R. Downey has been named to supervise sales of Hercules Powder Co.'s agricultural chemicals in Florida, Georgia, Alabama, and a major portion of Tennessee. Mr. Downey has been with Hercules since 1942 and, in his most recent assignment, served as senior technical representative for agricultural chemicals.

Fairfield Specialty Line

Fairfield Chemicals, Food Machinery and Chemical Corp., New York, is offering a new Powco brand line of specialty base products that includes several specially conditioned forms of Dri-Die, W. R. Grace and Co.'s insecticidal silica aerogel, combined with Pyrenone. The Powco line also includes products formulated with Sevin.

Springer Joins Central

Frank B. Springer Jr. has joined Central Chemical Corp., Hagerstown, Md., as a technical service representative.



99 percent sulfur grinding.

Write for more information.

TOUGH MATERIAL SPECIALIST-

The Model 12B Michigan



CHROME and CARBORUNDUM

ORE are unloaded fast by this 16 cu ft Model 12B. Owner. New York Central RR. Location: Jersey City. Like all Michigans, the 12B has efficient all-Clark power train, including power-shift transmission, torque converter, planetary-wheel drive axle.



BROKEN GLASS reclaiming is the prime use of this Michigan Model 12Bowned by Fairmount Glass Works, Indianapolis, Indiana.



COKE, used by American Brake Shoe Co, Buffalo, is dumped into hopper. Note cramped quarters easily negotiated by the Model 12B.



BROKEN TILE, 400 tons per 8 hour day—that's the output of the two 12B's owned by Oconee Clay Products Co., Milledgeville, Georgia.



FERTILIZER, tight-packed and hard todig, yields to powerful Virginiaowned Model 12B. Note the heaped bucket, a "trademark" of all Michigans.



DOLOMITE, charged directly into red-hot open hearths, is this Michigan's tough, but successful assignment in this Illinois steel plant.

Your "tough jobs," too, are made to order for Michigan Tractor Shovels. Model 12B capacity is 3,000 lbs, buckets are available to carry from 6 to 27 cubic feet. Write for details.

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CLARK EQUIPMENT COMPANY
Construction Machinery Division



2463 Pipestone Road Benten Harber 34, Michigan In Canada: Canadian Clark, Ltd. St. Thomas, Ontario



AIN SEWED CLOSURE

The simplest and most popular sewed clasure for textile, paper-lined textile and paper bags of all sizes.



POLDED TOP CLOSURE

An excellent plain sewed closure for multiwall paper bags. Bag top is folded over and sewed through to form a strong, neat closure.



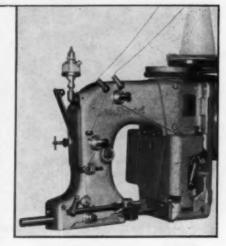
TAPE-BOUND CLOSURE

Multiwall paper bags closed with tope-bound closures add to package sales appeal and provide a bag that can be handled without fear of closure breaks.

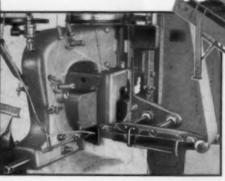
LOWER PA BETTER BAG CLOSURES!

If you're interested in bringing packing costs down, here is the way to do it. Take advantage of Union Special's wide knowledge of bag closing and its problems. By selecting your equipment from Union Special's complete line you can get the correct equipment for your particular job - equipment that will do it better, faster and cheaper, giving you a stroager closure at lower cost.

In the Union Special line you will find machines for closing all sizes and kinds of bags from small textile or paper bags up to the largest multiwall paper bags in use today. Whether your production schedule calls for closing just a few bags or for high continuous output, Union Special can supply the equipment to do the work efficiently, economically, dependably! For detailed information, see our nearest representative or write today.



CLASS 20500 (left) machines are heavy-duty, high production units for closing medium and heavy weight bags. Available with power-driven horizontal conveyor, inclined con-veyor, or both; or with conveyor transmission unit only, for plant production



STYLE 80600 H Sowing Head (left) is designed for making

tape bound closure on multiwall paper bags. Automatic tape clipper.



Worldwide Sales and Service

MACHINE COMPA

447 NORTH FRANKLIN STREET . CHICAGO 10, ILL., U.S.A.

BAG CLOSING MACHINES **Lundahl Advanced By Grace**

Lloyd E. Lundahl, Jr. has been appointed general manager of Caribe Nitrogen Corp., San Juan, Puerto Rico. He had been plant manager since 1959. Caribe Nitrogen is operated by the Nitrogen Products Division of W. R. Grace & Co.

Mr. Lundahl joined the Nitrogen Products Division in 1954 as assistant chief engineer at its Memphis, Tenn., plant.

Chipman Names Brooks

Chipman Chemical Co., Bound Brook, N. J., has appointed Warren W. Brooks as sales representative and technical advisor for its St. Paul, Minn., district. Mr. Brooks formerly was supervisor of wood preservation for the National Pole Treating Division of Minnesota and Ontario Paper Co.

Vulcan Names Lynch

David W. Lynch has been named vice president-sales for Vulcan-Associated Container Companies, Inc., Birmingham, Ala. He had been general sales manager.

Esso To Build In Wales

Esso Petroleum Co., Ltd., and Fisons, Ltd. will build an ammonia plant adjacent to Esso's new refinery at Milford Haven, Wales. The plant will be operated by Esso on behalf of a joint company to be formed on a 50-50 basis by Fisons and Esso.

The plant's output will be piped to a wholly-owned Fisons plant which will be built nearby. Fisons will use the ammonia to make nitrogen products for the fertilizer and chemical industries.

U. S. Borax To Market FTE

The Ferro Corp., Cleveland, Ohio, has appointed U. S. Borax & Chemical Corp. as its national sales representative for the marketing of its fritted trace fertilizer supplement, FTE, in the domestic fertilizer industry.

Huber Buys International Clay

J. M. Huber Corp., New York, has acquired the assets of International Clay Co., Graniteville, S. C. International Clay's kaolin mine and properties adjoin Huber's largest mine in South Carolina.

Entomologists To Meet

The 32nd annual meeting of the Rocky Mountain Conference of Entomologists will be held at the Cameron Pass 4-H Club Camp (near Gould, Colorado), August 6 to 10.

Niagara Adds Four

Four midwestern sales representatives have been added to the staff of Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y. They are: Kenneth M. Harrison, southwestern Indiana and western Kentucky; Robert T. Morgan, northern Indiana; Robert D. Shockey, southeasttern Indiana and central Kentucky; and E. Dean Wolfe, Nebraska.



THE SUPERIOR
ANTI-CAKING,
CONDITIONING AND
COATING AGENT
FOR HIGH-ANALYSIS,
GRANULAR,
COMPLEX
FERTILIZERS

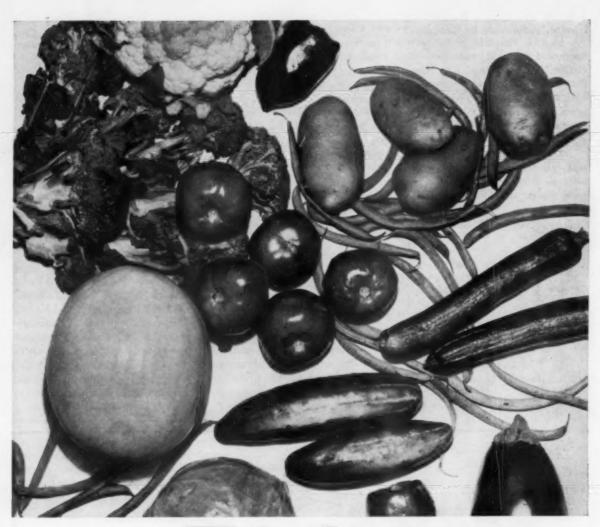
KENITE 51 made from high-quality diatomite (diatomaceous silica) is highly economical to use. It is up to 400 percent more efficient than other conditioners because of its greater surface area. This means less is needed, leading to a very low cost per ton of fertilizer conditioned.

Write today for complete information on KENITE 51 and learn how it will improve the handling of your fertilizer and result in more satisfied customers.

• Kenitize Your Fertilizer!

KENITE CORPORATION

OVERHILL BUILDING SCARSDALE, N. Y.



now...use Thiodan on all these

Broader registration for Thiodan —powerful new insecticide—gives you effective, economical control of aphids and many other important insects.

Thiodan cleans up heavy aphid infestations where other sprays and dusts fail. It outperforms previously available materials; fewer applications give positive, long-lasting control of a wide range of vegetable insect pests.

CROP	TO CONTROL	APPLICATION
Beans	Mexican bean beetle	Up to pod formation
Broccoli Cabbage Cauliflower	Cabbage looper, imported cabbage worm, diamond-back moth larvae, cross-striped cabbage worm	Up to formation of edible parts
Cucumbers, Melons, Squash	Aphids	Up to 14 days prior to harvest
Eggplants, Peppers	Aphids	Up to 7 days prior to harvest
Potatoes	Flea beetle, Colorado potato beetle, leafhoppers, aphids, southern armyworm, green stink bug, potato tuberworm, leaf-footed plant bug	Up to harvest
Tomatoes	Aphids, whitefly, Colorado potato beetle, flea beetle, green stink bug	Up to 7 days prior to harvest

Thiodan is a registered trade-mark of Farbwerke-Hoechst A.G.

Thiodan®

TECHNICAL CHEMICALS DEPT., NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORPORATION, MIDDLEPORT, N.Y.

General Chemical Poster Campaign Aimed At Farmers

The General Chemical Division of Allied Chemical Division of Allied Chemical Corporation is introducing a number of products to farmers in 14 states from coast to coast through poster advertising. The principal products being advertised in this manner are Plyac,





travel patterns and to coincide with growing seasons. Magazines and newspapers also are used in the campaign. that covers ten broad topics of executive concern – administrative management, financial management, insurance, purchasing, transportation, personnel development, public relations, marketing, production, and future growth possibilities.

In addition to the formal program, John Baker, director of the Agriculture Credit Service, U. S. Department of Agriculture, will discuss "The Administration's Agricultural Policy and Program" at a banquet session on July 20.

2.4-D Provokes Farm Hassle

A disagreement over the use of 2,4-D between two farm groups in Oregon—the wheat ranchers and the small fruit and vegetable growers— has been temporarily settled by the state's House Agriculture and Livestock Committee at a hearing on a proposed bill that would regulate the use of 2,4-D on agricultural lands.

The truce was made possible when the committee said it would suggest an amendment to an Oregon statute that established a 10-mile restricted zone between wheat fields and horticultural land in the Milton-Freewater area of Oregon. In this buffer zone only a low-volatile herbicide can be used. The committee also tabled the proposed legislation.

The proposed amendment would add another 10 miles to the restricted area. At the same time, the committee said that it would ask for a \$10,000 appropriation to investigate the effects, if any, of high-volatile herbicides on small crops.

The Blue Mountain Horticultural Society in Milton-Freewater had charged that the small fruit and vegetable industry in northeast Oregon, valued at more than \$3 million, was being threatened by the high-volatile herbicide which damaged small crops. The wheat ranchers contend the high volatile chemical is the only one that can successfully kill the weeds that hamper wheat growth. And, wheat ranchers added, there was no scientific proof that the 2,4-D damaged the small crops.

IMC Management Seminar

Some 65 plant food executives are scheduled to attend a Fertilizer Management Seminar to be sponsored by International Minerals & Chemical Corp., at IMC headquarters in Skokie, Ill., July 19 to 21. The sessions will be concerned with a hypothetical case history

To Mine Coal For Fertilizer

American Humates Inc., Dallas, Texas, has been awarded leases on more than 4,000 acres of federal coal-bearing land north of Glenrock, Wyoming, where it will construct a 75-tons per day fertilizer plant this fall. The coal is said to have unusually high content of nitrogen and oxygen and will be sold only to fertilizer companies.



" BEL LIQUALIZERS GIVE US FAST, FOOLPROOF BLENDING"



CARPENTER SUPPLY CO.

Mr. W. R. Stephens, Manager Chemical Flarks Mwision Barnard & Loss Mrg. Co., Inc. Coder Rapids, Iona

Because we've operated liquid fertilizer blending facilities since 1950, we have a definite yaretick for comparing basic blending equipment with the more mlaborate DML units we installed last year.

Your equipment cases out may be room to so more of our outlets go into bending operations, we're standard to on Hal Liquelizors. They give us fast, foolproof blending.

Here at our main plant in Bondurant we're very setiafied, also, with the performance of both the MEL jurobatch Skid Plant and the Cornelis 1978 Now as up to "Laline" formulas fact fol accurately. A customer can give us his order to this way with five tons of finished product in around 15

of our business; we're challenge of our business; we're the business; to business; id fertiliser production available.

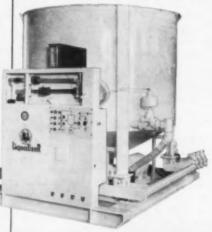
Mincerely,



LYLE CARPENTER, Carpenter Supply Co., Bondurant, Iowa.



Carpenter Supply Co., Bondurant, Iowa, has built a highly successful business through providing a well-rounded service to farmers. In 1960, a complete B&L plant for manufacturing liquid fertilizers was installed, and in addition several CSC dealers have so far been equipped with B&L Liqualizers for local blending operations.



The 🕰 LiqualizeR

Complete solubility, fast operations, and quality control through semi-automatic features are outstanding advantages of this liquid fertilizer blending unit. A hydro-mix jet and whirlpool action provide superior blending, and scale control of ingredient flow makes precise formulation standard . . . with the LiqualizeR. Graphic control panel available as optional equipment.



B_EL ConvertoR

For economical production of Aqua Ammonia.

BL AutobatcH Skid Plant

For production of 8-24-0 and complete analysis liquid fertilizers automatically.



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ICC Balks Freight Fare Cut

The Interstate Commerce Commission has disapproved a bid by the Atlantic Coast Line Railroad and the Seaboard Air Line Railroad to lower the freight charges for phosphate rock from Florida to Norfolk, Va. The railroads had proposed a rate of \$4.75, down from \$5.36, per ton on bulk phosphate rock. Specifically, the proposal covered bulk material in covered hopper cars-carload minimum 140,000 pounds, minimum 500 tons a shipment-moved on the same day on one bill of lading to one consignee at one destination between the Florida pebble rock district and the Norfolk area.

The ICC felt the move was an effort on the part of the railroads to strengthen their hold on the phosphate rock business by accepting a reduction in net revenues. "Considering," the ICC said, "the critical need for increased revenues by these and other carriers, the proposed rate may not be approved as lawful."

Label Claims Listed

Di-Syston granular insecticide has been registered for use on potatoes to control aphids, leafhoppers, and flea beetles. Also, Dylox 50 per cent soluble powder and Dylox dust now are registered in the U. S. for use on tobacco.

In other moves, the U.S. Department of Agriculture last month cleared the use of Sevin 50 per cent wettable powder insecticide in sprays on filberts. Sevin was used last year in dust formulations but some tests have indicated that spray applications may give more effective control. The label registration for the use of Diazinon on tomatoes for the control of Drosophila (vinegar flies), dipterous leafminers, and aphids has been altered to reduce the interval between application and harvest from three days to one day.

The registration for Thiodan insecticide has been broadened to include two additional potato pests —potato psyllid and European corn borer – and to permit the use of Thiodan on pears for the control of consperse stink bug through the petal fall stage.

Increased Production Begins

Production has begun at a new plant for Urox and Urab herbicides at the Baltimore, Md., works of Allied Chemical Corp.'s General Chemical Division. The new facilities permit a 400 per cent increase in production capacity.

Robert Fiss Joins CSC

Robert L. Fiss, formerly of United States Steel Export Co., has joined Central Resources Corp., New York, where he will be active in the latter's international fertilizer activities.

Kimball Elected By Snell

Cyrus S. Kimball has been elected president of Foster D. Snell, Inc., New York. He had been executive vice president of the corporation since 1953.

Mr. Kimball succeeds Dr. Foster D. Snell, who has served as president and chairman of the board of the corporation since its founding in 1930. Dr. Snell continues as chairman of the board.

Ortho Merges Districts

California Chemical Co., Ortho Division, has consolidated its mid-Atlantic and western New York districts. Dr. Robert T. Wallace, formerly manager of the mid-Atlantic district, is manager for the new district. M. E. Wierenga, Ortho's marketing manager and vice president, said that the new district was formed because of the increased interest being placed on outdoor living and gardening. The 15-state area now is serviced from headquarters at Haddonfield, N. J.

Chipman Appoints Huckins

Chipman Chemical Co., Bound Brook, N. J., has appointed Robert K. Huckins as technical service representative for its Chicago district. He has been with Chipman since 1957.



Book Reviews

Pesticide Specifications

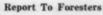
Specifications for Pesticides, published by the World Health Organization, Geneva, Switzerland. Price \$10, 523 pages.

This manual contains the specifications established by various World Health Organization Expert Committees on Insecticides between 1950 and 1958 for the most important pesticides used in the control of human diseases and for the equipment necessary to apply these products. It will serve as a guide to both manufacturers and users of such products and equipment.

The book is divided into six main parts, dealing respectively with insecticides, rodenticides, molluscicides, herbicides, auxiliary chemicals (anti-louse products, synergists, anti-oxidants, etc.), and spraying and dusting apparatus. This is the second edition of this work and it has been considerably enlarged by the inclusion of specifications for a range of new substances and formulations. In addition, a number of specifications have been revised, mainly as regards methods of analysis. The first edition was published in 1956.

The new specifications relate to the insecticides chlorthion and dipterex and their formulations, diazinon and malathion dusting-powders, larvicidal oils and granules, and new rodenticides and auxiliary chemicals. A section on herbicides is entirely new. On the other hand, no changes or additions have been made in the specifications for spraying and dusting equipment.

This worthwhile reference work is available in the United States from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.



The Use of Chemicals in Southern Forests, edited by Robert W. McDermid. Published by Louisiana State University Press, Baton Rouge. 152 pages, price \$4.

A compilation of 15 papers presented at the ninth annual Forestry Symposium at Louisiana State University last year, this volume constitutes a report to the practicing forester on the progress which has been made to date by forest scientists in adopting and utilizing chemicals as forest management tools.

Among the authors and their topics included in the book are: Albert L. Leaf, Syracuse University. "Forest Fertilization Research and Application in Other Countries"; J. Fielding Reed, American Potash Institute, "Forest Fertilization Research and Application in other Regions of the United States"; Laurence C. Walker, University of Georgia, "Observations on Forest Fertilization": Fred A. Peevy, USDA, "Basal Application of Herbicides for Control of Woody Plants"; and John H. Kirch, Amchem Products, Inc., "Foliar Application of Chemicals to Weed Tree Species."

Also: Paul Y. Burns, Louisiana State University, "Use of Aircraft for Foliar Applications of Herbicides in Southern Forests"; Ernest A. Epps, Louisiana Department of Agriculture, "Legal Problems Connected with Widespread Application of Chemicals"; James A. Beal, USDA, "Combating Forest Insects with Chemicals"; and John L. George, U. S. Fish and Wildlife Service, "Possible Effects of Widespread Use of Forest Chemicals on Wildlife Populations."

Not only are the complete texts of these and other talks reproduced in this book, but notes of discussions held following each address also are included, as are illustrations and charts. A complete listing of literature cited by each speaker also is included to make this a most valuable reference work for practicing foresters.



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Nitrate

Solutions

• COLE was first to build welded aluminum tanks for nitrate solutions, just as we have always pioneered in supplying the plant food industry with tanks or equipment for the storage or processing of agricultural chemicals. . . . Send us your inquiries for conventional or special design tanks—shop built up or field erected, using flat, flanged and dished, or hemispherical heads. Write for a copy of Tanks and Equipment for the Plant Food Industry.

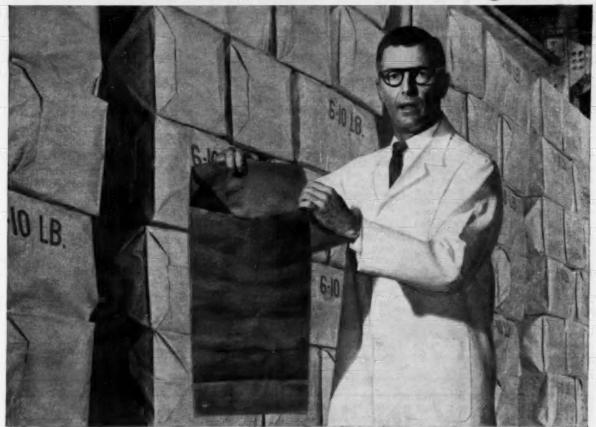


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R. D. COLE MANUFACTURING CO. NEWNAN, GEORGIA

Another Technical Advance from West Virginia



BALEX

The New, Tougher, Lower Priced Baler

BALEX is a new and superior single ply shipping container made from a new, extra heavy kraft Clupak*extensible paper. It will outperform any single or double wall baler bag currently available, yet cuts costs up to 10%. If you ship almost any dry product—in pockets or in bulk—it will pay you to get the whole story on BALEX.

BALEX is the newest in a growing number of developments by West Virginia to provide better bags at lower cost. Some of the other recent technical advances are:

Impactape™ closure—drastically reduces sewn-end bag failure by adding four layers of tape to the sewn end.

KraftsmanTM Clupak extensible paper—pioneered the unique "stretchable" kraft that cuts bag breakage.

WONDERWALLTM bags—developed the technical knowledge needed to convert Clupak extensible paper into better and less expensive bags where lighter or fewer plies do more work.



West Virginia
Pulp and Paper

Whatever your bag problem, we invite you to put it up to us. Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, New York.

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications.

West Vir	l Bag Division, Dept. T261 ginia Pulp and Paper Company Avenue, New York 17, New York
Gentleme	en: Please send me more information on:
	☐ Kraftsman CLUPAK extensible paper trape ☐ Wonderwall Multiwall Bags
For	(Product)
For Name Company	(Product)

LITERATURE AVAILABLE

Bulletins listed in this column are available from the organizations by which they are prepared.

Public Relations . . . Chemicals and Foods, by U. S. Dept. of Agriculture, Picture story No. 127, August, 1960. 8 pages. Pictures illustrating what pests can do to crops and livestock and what is being done to protect same. USDA, Office of Information, Wash., D. C.

AC

Ammonium Nitrate . . . Ammonium Nitrate-Behavior in Fires, by Chester I. Babcock, NFPA Q 53-10, Reprint from January, 1960. 8 pages. List conditions necessary for accidental fires, and suggests correct storage method of ammonium nitrate in buildings. National Fire Protection Assn., 60 Batterymarch, Boston 10, Mass.

AC

Public Relations . . . Chemicals in our Food, reprint from Changing Times, May, 1960, 6 pages. Explains what is added to foods and why. 1729 H St., N.W., Wash., D. C.

AC

Khapra Beetle . . . A Summary of Information About the Khapra Beetle, U. S. Dept. of Agriculture - Market Quality Research Division, AMS-390, July, 1960. 12 pages. Discussion on biology, feeding habits, life history, and control of this beetle are presented with references and related topics listed. USDA, ARS, Wash., D. C.

AC

North Carolina Report . . . North Carolina Insecticide Report for 1958, North Carolina Dept. of Agriculture, Number 156, June, 1959. 128 pages. Economic poisons used in North Carolina. N. C. Dept. of Agriculture, Raleigh, N. C.

BC

Public Policy . . . Pesticides and Public Policy, by Nat'l Ag. Chem. Assn., May, 1960. 21 pages. Describes pesticide industry and various incidents, plus congressional and senatorial investigations of the industry. NACA, 1145 19th St., Wash., D. C.

AC

Maine Research . . . Maine Farm Research, Frank J. McDonald, Volume 8 No.2, July 1960. 38 pages. The history of Maine's agriculture, viewed from the Highmoor farm. Maine' Agric. Exp. Station, Orono, Maine.

AC

Aerial Spraying . . . How to Spray the Aircraft Way, by U. S. Dept. of Agriculture. Farmers Bulletin No. 2062. Issued June, 1954. 32 pages. How spraying can save you money and give you various benefits by using careful plan-

ning and teamwork. Also gives spraying facts and figures plus the laws pertaining to spraying. USDA, Wash., D. C.

AC

Pesticide Handbook

Pesticide Handbook by Donald E. H. Frear. Published by College Science Publishers, State College, Pa., Price \$2 paper bound; \$3 cloth bound. 286 pages.

This is the thirteenth annual edition of Pesticide Handbook and it contains information about 9,072 commercial pesticide products, an increase of about 15 per cent over the 1960 edition. Furthermore, compatibilities, hazards, and tolerances are listed for the more common pesticides and a complete listing of manufacturers and their products also is included.

Among the products listed are insecticides, fungicides, herbicides, rodenticides, soil conditioners, and equipment, making this a valuable reference guide for those interested in any phase of insect control.



NEWS BRIEFS

M. E. Ocker, manager of the Wichita plant and sales division of Bemis Bro. Bag Co., St. Louis, since 1928, retired recently. He had been with Bemis for more than 50 years.

BC

WILLIAM HIGHTOWER has been appointed to the south central district field sales staff of Geigy Agricultural Chemicals, division of Geigy Chemical Corp., Ardsley, N. Y. He had been with Velsicol Chemical Corp., Chicago.

AC

A SAFETY CITATION and plaque have been awarded to the Middleport, N. Y., headquarters of the Niagara Chemical Division, Food Machinery and Chemical Corp., for 1,491,887 man hours without a lost time accident.

AC

CHARLES W. BOURG has been named industry representative—agriculture, for the marketing development division of United States Steel Corp., Pittsburgh, Pa. He has been with the company since 1956.

AC

CHESTER E. GRAVES, manager of the Palo Alto, Calif., biochemicals sales district of the Du Pont Co.'s industrial and biochemicals department, will retire July 1 after 32 years with the company.

AC

DR. HERBERT E. MORRIS, director of the Boston Laboratories of Monsanto Research Corp. at Everett, Mass., has been appointed technical director of the corporation.

AC

GEORGE C. RAYNER has been appointed assistant to the president of Allied Chemical's General Chemical Division. He has been with the division for 30 years.

AC

JAMES P. GURNEY, executive secretary-editor of the American Rose Society, plans to resign from the society and will be associated with O. M. Scott & Sons Co., Marysville, Ohio.

AC

LOUIS E. CHILDERS, an information chief in the Department of Agriculture, died last month in Washington, D. C. He was 60 years old. Since 1954, Mr. Childers had directed the current information branch of the Agricultural Research Service.

AC

RUSSELL I. PISLE has been named staff assistant to the agricultural sales manager by the Sohio Chemical Co., Lima, Ohio. He joined Sohio in 1955.

AC

BEMIS BRO. BAG Co., St. Louis, spent more than \$2,750,000 on its plant expansion and modernization program during 1960, according to the company's annual report.

BARRY A. FRAZEE has been appointed sales representative for United States Borax & Chemical Corp. in Texas, Oklahoma, and New Mexico.

AC

ARTHUR H. SWANSON has been appointed director of purchasing for Stauffer Chemical Co., New York. He succeeds Kenneth H. Allen who died last month.

AC

WILLIAM S. CUMMINGS has joined Gray Chemical Inc., Gloucester, Mass., as marketing manager for fertilizer products. He had been with Vick Chemical.

AC

BENJAMIN R. PICKERING has been elected assistant secretary of United States Borax & Chemical Corp., Los Angeles. He has been with U. S. Borax and its predecessor company, U. S. Potash, since 1951.

AC

HERBERT SPENCER COHEN, vice president of American Metal Climax, Inc., New York, died last month in Brooklyn, N. Y. He was 59 years old.

AC

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ROBERT J. SMITH, JR. has been appointed a technical sales representative by Chemagro Corp., Kansas City, Mo.

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CSMA MEETING

(From Page 38)

containing the insoluble poisons, such as diazinon, and baits containing 0.1% DDVP were more attractive than baits containing higher concentrations of the same chemical.

Dr. Decker concluded that a number of factors, such as weather, number of animals, and regularity of morning treatments, would affect the efficiency of the bait treatments.

Insecticide Marketing

"There is more consumer ignorance about insecticides than almost anything else one can find in the modern supermarket. There also is more confusion at the insecticide display . . . confusion between products of the same manufacturer . . . confusion between competing brands." This statement was a highlight of a paper titled "A Consumer Looks at Insecticide Marketing" by Andrew B. Meldrum, Meldrum and Fewsmith, Inc., Cleveland, O.

"Because of self-service, and because of the confusion in consumers' minds, it is my feeling that the biggest - and one of the easiest - areas where insecticide manufacturers can help themselves is in the way they package their products. I'm not talking about the overall design or color or attractiveness. In most cases, insecticide packages look just as modern as any. But insecticide manufacturers have a different problem - that of answering consumer ignorance. Before a customer buys any product, he wants to know the answers to three questions:

- (1) What is it for?
- (2) How do I use it?

(\$) What results can I expect?"

A translation of these questions to the insecticide package, Mr. Meldrum suggested, reveals few answers. He reported a conversation with a salesgirl in which she displayed little knowledge of any of these questions. This proves, he suggested, that "manufacturers can no longer assume that salespeople will do a careful or intelligent job of explaining their products."

"More and more, the package will determine what happens at that vital point of sale. Answer the consumers' questions, and increased sales will be the reward. Why not tell how the product works? Does it kill only on contact, or while the spray is still wet? Does it do anything to get at the source, like the poison the ants eat and take back to their nest? And what is the difference between the house and garden killer and the ant and roach killer? There isn't one consumer in a hundred who - looking at two typical packages - could tell the difference. I know, of course, that the formulations are on the back . . . but a consumer is not a chemist."

The remainder of Mr. Meldrum's paper was devoted to photographic slides showing typical displays in self-service food and drug stores. By use of these he demonstrated the same-ness of the various competing brands in answering the key questions. He complimented Boyle-Midway's "Black Flag Ant & Roach Killer" for telling the consumer how long the material will last. He charged that even major marketers of insecticides are · "Turning over the job of writing the small print on the backs of insecticide packages to guys in an advertising department. The result is a rewrite of what your competitors are saying. You certainly are not getting any original ideas, related to what consumers want toknow."

Pest Control In Russia

Dr. H. L. Haller, assistant to administrator, Agricultural Research Service, USDA, Washington, D. C., presented some personal observations on pest control in Russia and other European countries. He described a tour he made of Russia during the summer of 1959 as a member of a U. S. delegation sent to the Soviet Union to observe insect control procedures.

Control of agricultural insect pests in the Soviet Union, he reported, is achieved with insecticides, biological methods, and cultural practices. The insecticidal chemicals available for practical use are limited in number, he said, compared to those available in the U. S. The principal insecticides are chlorinated hydrocarbons and organic phosphates. Of the chlorinated hydrocarbons, DDT and BHC (geksachloran) are the most widely used. DDT, Dr. Haller said, is used as a dust and a wettable powder.

There was no evidence, he said, that organic fungicides, now widely used in the United States, are available in the USSR. Some of the chlorinated hydrocarbons that are used commercially in the U. S., such as aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene, have been studied experimentally in the USSR, he said. Dr. Haller added that there is considerable interest in organic phosphates as insecticides, particularly as systemic insecticides.

Statistics on insecticide use in the USSR were not obtainable, Dr. Haller said. In the course of gen-

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eral discussions, however, he reported, the statement was made that in the Ukraine 70,000 tons of insecticides and 11,000 tons of fungicides are used annually. In Uzbek Republic, it was stated that 208 tons of organic phosphates were used in 1958 and it is estimated that in 1959, 800 tons of organic phosphates were applied to crops.*

LEGAL PROBLEMS

(From Page 55)

users of chemicals. If work is needed, the safer the job done, the less likely are restrictions to be imposed. Regardless of what may be thought, legislators and state officials do not just rush right out and hatch up regulations or pass legislation merely for the sake of doing so. They do so only when a problem has arisen. If applicators and other users of agricultural chemicals can conduct their affairs in such a way that no problem arises, they can be assured that there will be no legislation and no regulations.

Chemicals can be dangerous and can cause trouble in a number of different ways, but they can be handled safely. They are being safely handled by many people every day, year in and year out. Applicators must be forewarned and forearmed. They must inform themselves of the hazards, use common sense, and not take chances.**

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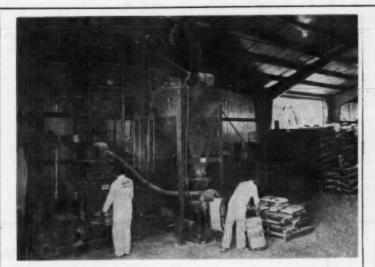
(From Page 16)

But once that supplier is found, future conformity is assured.

"Potash falls in about the same category as solid nitrogen. Each supplier has his own automatic size distribution, and a manufacturer who buys from one supplier has only minor difficulty in predicting what he will receive as a given grade of potash.

"Phosphate is the big headache. Analyses are unpredictable and particle size ranges in the run of pile and coarse grades are also unpredictable. I can understand why analyses vary. When the analytical method for determining a quantity depends on sample size, time of extraction, degree of agitation, presence of soluble salts, temperature and pH of extractant, it can be seen that correlation between laboratories might be poor.

"In addition, when the quantity desired is affected not only by the particle size of the raw materials, length of cure of the product, and source of raw materials per se, but also by the normal variation in the ratio of raw materials used, it is understandable that variations would occur in product analyses. However, the above reasons for variations should not be a reason for negligence on the part of the supplier to send a copy of the analyses to the user by whatever means are necessary to ensure that



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the user receives the analyses before he receives the product shipment.

"With the inherent variability of the P₂O₅ content of triple superphosphate, it is preposterous to assume that a given carload unloaded from a barge will have an analysis within 0.5 units P₂O₅ of the barge average. The logical answer is to provide means for determining APA quickly as cars are loaded, regardless of where they are loaded, so the user can receive analyses before the shipment arrives.

"Because of the inherent variability of APA in an acidulated rock phosphate product, setting up 0.5 limits of variance for triple superphosphate appears impractical to me. When our own superintendents can guarantee their manufactured normal superphosphate within \pm 0.2 units APA, where they have control of the manufacturing process, I will believe that they can expect triple

superphosphate within ± 0.5 units APA.

"To repeat, the exact APA of a phosphate product is not as important as the knowledge of what is the APA. However, a user should expect a fair measure of uniformity from one end of a box car to the other.

"Particle size of triple superphosphate, especially run of pile, is less predictable than is the APA content. The answer to the problem may lie in a price schedule varying with the degree of particle size uniformity desired. The practice has begun in charging a premium for granular triple. It could be extended if the user were willing to pay for the extra effort necessary to guarantee a specific size distribution. Again, competition in itself may force changes in production techniques once a given supplier has found a breakthrough for ensuring specific size distribu-

(To Be Continued Next Month)

WORLD MARKET

(From Page 18)

paid by a subsidy from the United States. Eventually, the Pakistani government will insist on local formulating only—and later may press for local manufacture of technical materials. For the next five years, however, Pakistan will rely on imports.

Because of the U. S. financial aid and the free distribution of pesticides by the Plant Protection Department, pesticides are used on a much higher percentage of farm land than in India. The organization of the Ministry of Agriculture, with the help of the U. S.-I.C.A., should be able to continue the promotion of good farming practices, including proper use of pesticides.

The Ministry of Agriculture believe they have accomplished a great deal during the past five years in pesticide work. They esti-

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mate this year's pesticide program will bring yield increases of 500,000 tons of food and cash crops with an approximate value of \$49 million, and that the program has been almost entirely responsible for increased rice yields of recent years. Control of rice insects is estimated to have resulted in increased yields worth 16 times the cost of treatment.

The world is a big subject. But these examples may present a new slant on the potential market for pesticides outside of the United States. Where there has been success, it has come only after hard work, and years of patient waiting by truly dedicated people in these nations. There is much hard work ahead, but the long years of waiting appear to be near an end.

News travels swiftly today, and the examples set in Egypt and Pakistan and a few other nations could very well set off a chain reaction that will result in a greatlyincreased, world-wide demand for pesticides. As in India, however, the problems may be too great to solve in a year, or in several years.

But the advantages of the chemical age of agriculture must inevitably be realized wherever there are mouths to feed and bodies to clothe. American manufacturers can lead in supplying these needed materials. What is good for the world is good for American economy. When the time comes, will the U. S. be ready? It could come sooner than any of us may think.*

DEALER SURVEY

(From Page 35)

followed closely by "too little net profit."

The remaining "gripes," in order of importance, were "cost of labor in handling," excessive overhead and storage costs," and "seasonality of sales." A few dealers indicated that they are confronted with the problem of a decline in volume of sales due to a tremendous decrease in acreages devoted to crops and to pasture-land resulting from the federal government's acreage reserve programs.

Information Sources

Dealers were asked from what sources do they receive the most information for their business. The answers to this question indicate that dealers are alert to many sources of information, which they pass on to their customers. Among those most frequently mentioned are; fertilizer manufacturers, agricultural colleges and county agents, the fertilizer inspection service and the various experiment stations, farm magazines and journals, vocational agricultural teachers, soil conservation services, and farmers themselves.

Anticipated Changes

The question was asked "Do you plan any changes in your fertilizer operation in the near future?" A summary of the answers to this question is as follows:

55 per cent planned no changes.

45 per cent planned changes.

About 40 per cent of the dealers anticipating some change intend to decrease the amount of credit business they do.

- 20 per cent will seek additional information about fertilizer and its use.
- 12 per cent will decrease the size of their fertilizer operations. The annual average tonnage (materials and mixed goods) for this group is approximately 780 tons each.
- 10 per cent expect to increase the size of operation. The average quantity of fertilizer ((materials and mixed goods) sold by these dealers was 1360 tons per dealer.
- 8 per cent were planning to add the use of tank-type applicators to their services.
- 5 per cent indicate that they will increase discounts on volume and cash sales.
- 2 per cent plan to erect liquid fertilizer storage facilities.
- 2 per cent said they would seek additional credit customers.

One-Day Meeting

A final question asked of the dealers was "Would you like Clemson College to hold a one-day meeting or school for dealers, either at one of its experiment stations or a central location in the state?" In response, 71 per cent of the dealers indicated that they would look with favor on such a meeting. Twenty-one per cent did not answer the question, suggesting that

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they at least would be only lukewarm to the idea. However, 8 per cent answered a flat "no."

CARBAMATES

(From Page 21)

fornia Chemical Company R-5305, has a very similar pattern of activity to the *m*-isopropylphenyl *N*-methylcarbamate and is somewhat less toxic to mammals.



Zectran 2/, a product of the Dow Chemical Company, is a more complex substance, 4-dimethylamino-3, 5-xylyl N-methylcarbamate. The LD values to laboratory animals range from 15 to 63 mg. per kg., but its dermal toxicity is low and chronic feeding studies have shown that 100 to 300 p.p.m. in the diet have no effect. Zectran is a contact and stomach poison with moderate residual life, and also has systemic activity. It is very effective when used at 0.25 to 1 lb. to 100 gal. of spray against many pests of deciduous fruits, cotton, vegetables and forage crops, and ornamentals. It is most spectacular in its action against lepidopterous larvae (Shorey, Reynolds, and Anderson, 1961), but is also active against bugs, beetles, maggots, grasshoppers, scale insects, aphids, thrips, mites, snails, and slugs.

An intriguing example of the relationship of chemical structure to activity is the independently developed 4-methylthio-3, 5-xylyl Nmethylcarbamate, Bayer 37,344. This compound has a somewhat similar spectrum of activity to Zectran and considerable residual action, especially to lepidopterous larvae. This company also has developed o-isopropoxyphenyl N-methylcarbamate, Bayer 39,007, which has an oral LDso to the rat of 175 to 200 mg. per kg. and is effective at low dosages to flies and mosquitoes, with a rapid knockdown. It also has a good spectrum of effectiveness against cockroaches, mites, aphids and some lepidoptera. Other alkoxyphenyl N-methylcarbamates are also active (Metcalf, Fukuto and Winton, 1960).

Many other promising carbamates are under laboratory and field investigation and some of these will doubtless appear as valuable commercial insecticides, with new fields of usefulness.

With any new group of insecticides, the question of acquired resistance by insects is of importance. Two comprehensive investigations of this subject have recently appeared. Moorefield (1960) subjected house flies to 67 generations of intensive selection with misopropylphenyl N-methylcarbamate and produced only 8-fold resistance. However, Georghiou, Metcalf and March (1961) produced more than 50 times resistance to this compound after 22 generations of selection of a strain of house flies which apparently had considerably more genetic heterogeneity. Similar selection with Isolan, however, resulted in only 7 times resistance. It is particularly interesting that the pronounced resistance to m-isopropylphenyl N-methylcarbamate was reduced to only about 2 times when this compound was applied with the synergist piperonyl butoxide.

One of the interesting features of this group of compounds is the synergism produced by combination with the methylenedioxyphenyl synergists such as piperonyl

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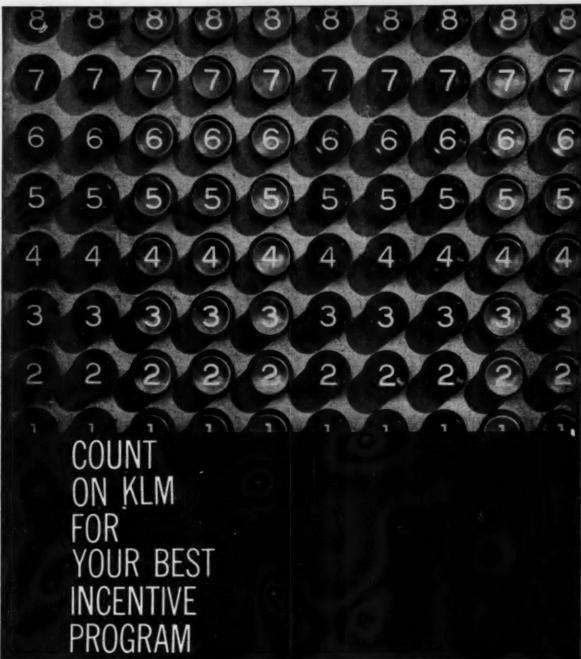
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butoxide, sulfoxide, propyl isome, and sesoxane. Moorefield (1958) showed that these materials could synergize the action of Sevin as much as 30 times against house flies, and to some degree against other insects. Similar synergism occurs with other carbamates, although it appears that in general the more active the compound the less the degree of synergism (Metcalf. Fukuto and Winton 1960). Other materials, such as octachlorodipropyl ether, are effective carbamate synergists (Georghiou and Metcalf, 1961), and this phenomena may ultimately be of value in producing more effective formulations and in overcoming insect resistance to carbamates.

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ROUND TABLE

(From Page 52)

results in haphazard flow from each orifice depending upon the resistance of the bed surrounding the orifice.

Within the plants of an individual company there can be found a variety of sizes of ammoniators. It is only by understanding the ideas behind the rotary ammoniator that field adaptation for each installation can be made.

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PEST ROUNDUP

(From Page 59)

latter part of April. Boll weevils were found in most cotton fields of the four lower Rio Grande Valley counties and some activity was noted in the Coastal Bend counties of the State. Wireworms were causing damage in some young cotton fields of Jim Wells, Bee, Live Oak and McMullen Counties. Spider mites and fleahoppers were present in both the Coastal Bend and Valley areas. In western Frio County, many cotton fields were treated for aphids.

In some Yuma County, Arizona, cotton fields about 50 percent of the seedling plants were infested with the beet armyworm. Most larvae were first and second instar, and egg counts were high. Darkling beetles were causing damage to some seedling cotton in central Arizona, and thrips averaged 10-15 per 20 plants in localized areas.

In Gadsden County, Florida, a wireworm was causing concern on approximately 500 acres of tobacco. It is estimated that 2 to 3 percent overall loss to the crop will result. Also in Gadsden County, cutworms were worse on shade grown tobacco than last year.

1960 Loss to Corn Borer

Results of the cooperative State-Federal fall European corn borer survey show the loss of corn grown for grain utilization attributed to that insect in 1960 to be an estimated 102,991,000 bushels. The value of the crop lost, based on the season average prices received by farmers, is \$96,085,000.

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The monetary loss in 1959 was almost 72 million dollars, but, in 1949, the corn borer dollar loss figure was almost 350 million dollars.★★

ITALIAN PRODUCERS

(From Page 41)

Fauser-Montecatini process have a production capacity that has been estimated at 1,000,000 tons annually, accounting for 48 per cent of the total world production.

With the construction of the Campofranco plant, in Sicily, Montecatini recently joined the ranks of world producers of 50-52 per cent potassium sulfate. This plant is linked to the San Cataldo mine by an overhead cableway 11 miles in length, capable of carrying 3,000 metric tons of Kalinite daily. The present annual capacity of this plant is 150,000 tons of potassium sulfate containing 50 to 52 per cent K₂O. 40,000 tons are of potas-

sium-magnesium sulfate, equivalent of 65,000 tons of K₂O, the latter figure equaling Italy's present total consumption. The Campofranco plant was designed for an eventual doubling of production, to be effected in accordance with consumption requirements.

The Rumianca Company, of Turin, was among the first companies in Italy to realize the importance of compound fertilizers for the achievement of high yields and for the development of truly modern and efficient agriculture. The compound fertilizers produced by Rumianca at its plant at Avenza, near Massa Carrara, are obtained by chemical reaction through a special manufacturing process patented throught the world. Other plants built under Rumianca license already are in operation in Italy and abroad.

All Rumianca fertilizers are granular and all of them contain nitrogen in ammonia form. In addition to fertilizers, Rumianca's production comprises other products for farm use, such as anti-cryptogamic agents, pesticides, herbicides, soil conditioners, and vegetable hormones.*

ARMOUR PLANT

(From Page 23)

pleted in 1962, the chemical industries part of the Armour organization will for the first time represent more investment than the total for abattoirs and meat-producing facilities of the parent Chicago firm.

Construction of the Cherokee nitrogen plant is being financed by the town of Cherokee under the terms of a \$25,000,000 bond issue, said to be the largest of its kind in the nation. When completed, the plant will be leased to and operated by Armour. It will be the largest facility of its kind in the country.**



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TALE ENDS

J APANESE scientists report that only a rock, a kind of liparitic tuff and the building material of Frank Lloyd Wright's Imperial Hotel in Tokyo, is capable of suppressing the uptake of radioactive strontium by plants. Furthermore, the use of Ohya stone in fertilizer pellets is said to prevent phosphoric acid fixation by the soil. The Japanese research team reports that, where Ohya powder is incorporated with a chemical fertilizer, increases in yield of 5 to 15 per cent have been observed. Farmers concerned about atomic fallout, therefore, can rest assured if their fertilizer is prepared with Ohya rock as a constituent. Their harvests will im-

prove and the build-up of Ohya stone in their fields will reduce any chances of atomic contamination.

Readers of our May issue were interested to hear of the retirement of John H. Kennedy as assistant to the vice president of Stauffer's agricultural chemicals division and of his plans to manage Bob Zipse's East Lake Camps in Oakland. Maine. John Kennedy and Bob Zipse are well-known names in the ag chem industry and anyone interested in beating, hunting, fishing, etc. duriny their vacation can count on a big welcome this summer at the East Lake Camps. Located on the head-

waters of the Belgrade chain of lakes. East Lake features small-mouth bass, boating, swimming, hunting, golf, and relaxation.

AC



The whodunit influence has extended to the Florida Department of Agriculture, where a movie entitled "Insect Lineup" is being produced. Harold Denmark, chief entomologist, is shown with some of the insect specimens collected for use in the movie. Soon to be completed by the Division of Plant Industry, Gainesville, Fla, the film is expected to be of considerable aid in the identification of insects.

AC

A bill currently being considered by the Oregon House of Representatives "plant damage research program" to de-termine what, if any, damage is caused to agricultural crops from the use of herbicides. The study is to be conducted through Oregon State University. Of particular interest to manufacturers of herbicides sold in Oregon will be the proposed method for financing the study. Under terms of the bill, a tax is to be imposed on each pound of 2,4-D and 2,4,5-T sold in Oregon between July 1, 1961 and July 1, 1963. The herbicide industry, thus, will provide funds to finance the study to determine what damage to crops is caused by 2,4-D and

AC

An advertisement recently placed by Stauffer Chemical Company in agricultural papers and magazines effectively stresses the importance of reading the label before using a pesticide. Entitled "The Most Important 4 Minutes in Pest Control." the ad points out that more economical pest control and greater personal and crop safety will result if users of pesticides on farms will read the labels carefully and follow their directions exactly. The ad also makes the point that "an extra spoonful for the pot" is not a good rule to follow when mixing chemicals.

8/

An indication that the cranberry industry still is paying for the 1959 mistake of a few growers who ignored the label and applied herbicides to their cranberries before harvest, is the report that cranberry sauce pack fell 39.3 per cent during 1960 to 4.2 million cases.

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER TELLS Why He Reads Agricultural Chemicals



WILLIAM N. ROEMER Custom Applicator Bowling Green, Ky.

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Mr. Roemer is a custom sprayer-dealer whose operations are centered in the Bowling Green area of Kentucky. In support of these operations, he conducts a continuing series of experimental plots to study the application methods that respond best to the soils and climate of his area. Mr. Roemer has been a custom sprayer since 1948.

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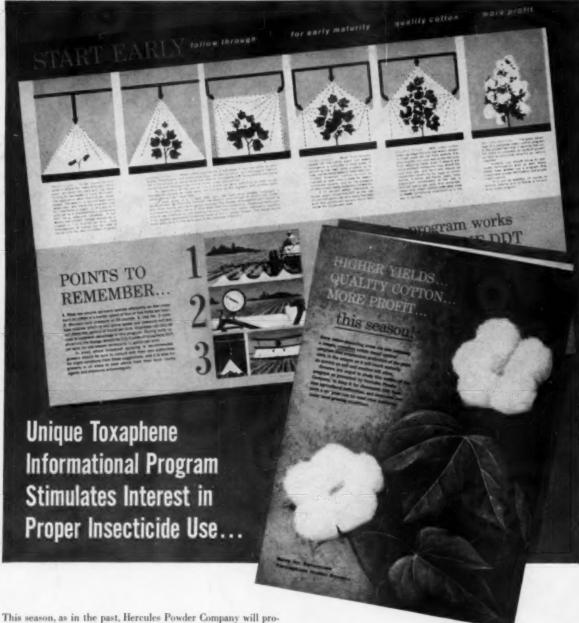
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This season, as in the past, Hercules Powder Company will promote an informational program designed to create an awareness of the need for better insect pest control. One of the highlights of the 1961 program is a four-page, four-color insert running in leading Cotton Belt publications, outlining a planned, complete program of cotton insect control with toxaphene-DDT, the insecticide combination with "synergistic action."

Toxaphene promotion with seasonal messages will also appear in local farm publications, newspapers, and on local radio and TV stations and other media. Hercules will also continue its longtime sponsorship of leading radio and TV farm directors in the Cotton Belt and in other prime toxaphene markets.

Millions of farmers will have a new interest in toxaphene and the toxaphene-DDT combination. The Hercules informational program will help them get the most from their insecticide dollar—build more confidence in insecticides.

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